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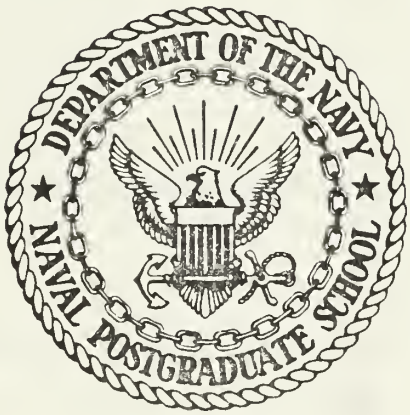

THESIS

HUMAN RESOURCE ACCOUNTING

by

Joaquim C. Martins

December 1984

Thesis Advisor: R.A. McGonigal

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In the Portuguese Navy, budgets are roughly 60% devoted to manpower and 40% to material. The Navy onboard strength is about 15,000 men, 12,000 sailors and 3,000 marines.

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The Navy as an organization is personnel intensive and the Navy management has been increasingly aware of the significance of manpower policies and their corresponding costs.

The goal of this thesis is to help the Portuguese Navy in formulating a formal and coherent approach to its human resource accounting, and in so doing, allow its management to realize the extent of loss and damage that can hurt the organization if the human resource assets are not addressed.

This thesis concludes with a tentative application of the normative economic valuation models to a sector of the Portuguese Navy.

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Human Resource Accounting

by

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Commander, Portuguese Navy
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Submitted in partial fulfillment of the
requirements for the degree of

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December 1984

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I. INTRODUCTION

A. DESCRIPTION OF THE PROBLEM, APPROACHES AND BASIC CONSTRAINTS

As was already pointed out human resources accounting deals with the accounting of people looked at as organizational resources. It is the measurement of the cost and value of people to organizations.

A primary objective of accounting for human resources is to help facilitate the effective and efficient management of people.

Thus there is a fundamental need for measures of human resource cost and value.

The measures are useful in the processes of manpower acquisition, development, allocation, conservation, planning, utilization, evaluation, compensation (reward) and discharge or retirement, as stated in page 11 of Reference 1.

Furthermore, human resource accounting also provides information about the ways management builds and depletes the human assets of the organization.

The accounting for human resources involves measuring the costs incurred by the organization to recruit, select, train, and develop human assets. It also involves measuring the economic value of people to organizations.

For achieving these goals the organization must develop an adequate Human Resource Accounting System which will allow information for human resource planning and control.

However, there are a couple of terms and concepts that have to be precisely defined before entering this system, as for example: What is cost? What are human resource costs? What are the different types of human resource costs? How can we measure human resource costs?

The answers for these and other questions are basic to the understanding of how to account for human resource costs, and will be developed later on in this thesis.

Anyway, the basic ideas are that costs are sacrifices incurred to acquire or replace people. They have expense and asset components, just as any other cost does.

Original cost of human resources is the sacrifice that was actually incurred to acquire and develop people, so it is an historical cost. Replacement costs refer to the sacrifice that would have to be incurred today to replace human resources presently employed.

Both original and replacement costs consist of direct and indirect costs as well as outlay and opportunity costs. Direct costs are traceable to a specified activity, while indirect costs are incurred for general use and are allocated to the activity. Outlay costs are actual cash expenditures while opportunity costs refer to revenue foregone in acquiring or replacing people.

Accounting systems for human resource costs that began being implemented after the late 60's were developed in two major directions, accounting for the investment in human resources and accounting and for replacement cost of human resources.

In either case the implementation of the concept of the human resource accountability requires four steps: (1) defining human resource investment, i.e., evaluate which part of the cost of the human resource is expense and which is asset (investment), (2) amortizing it, i.e., throughout the expected organizational life of the asset, (3) allocating responsibility for it, i.e., define precisely whom is in charge of conservation of the assets, and (4) measuring how well managers conserve it, i.e., maintain and update the value of the human assets of the organization and reporting the trends to management.

Step (1) is in fact the one needing special care to be formulated, especially in the case of replacement costs due to the need of calculating the person's value to the organization. The principal variables of interest may not be directly assessable, and surrogate measures or proxies will have to be employed.

The choice of these surrogate measures must be very careful for assuring us that they are valid. A process of validation of the proxy variable goes throughout the measure

of its (1) reliability, i.e., the values given by the proxy when applied in different times to the same problem must be quite close if not the same, and (2) validity, i.e., the proxy is actually measuring what in fact it was supposed to measure (the variable of interest).

The concept of human value is derived from general economic value theory. Like all other resources, people possess value because they are capable of rendering future services. Thus the value of people, like that of other resources, is the present worth of their expected future services.

In other words, an individual's value to an organization can be defined as the present worth of the set of future services he is expected to provide during the period he is anticipated to remain in the organization. This concept is basically probabilistic. It can be applied to an individual, one group or to an organization as a whole. Values of groups or organizations are not necessarily constructed of the summation of the elements, because we can have synergy, i.e., the output of the whole can be greater than the summation of the output of the elements. The Flamholtz model for a person's value stresses as the ultimate measure of a person's value its expected realizable value. This is composed of two variables: conditional value (potential value) and the probability that the person will remain with the organization during his expected service life.

The conditional value of a person depends on his promotability, transferability, and productivity. These in turn depend on both the skills and the activation level of the individual. The organizational determinants of a person's conditional value include the degree to which the role assignments correspond with the individual's skills and personal goals, and the system used by the organization.

The probability of a person staying in an organization is directly related to the degree of job satisfaction that he (she) feels.

Another model in use is the Likert and Bowers model, described by Eric Flamholtz in "human resource accounting". This model tries to portray the variables which affect a group's value to an organization. Causal variables (controllable by the organization) and intervening variables (reflecting organizational capabilities) determine the end-result variables of the company. The causal variables include managerial behavior and organizational structure. The intervening variables include group process, peer leadership, organizational climate and subordinates' satisfaction. The end-results are the total productive efficiency of the organization.

Besides the monetary measurement of the human resource value that we have been talking about, there are also important non-monetary human resource valuation formats.

They can be used for decisions that do not require monetary measures of human resource values. Also they can be used as surrogates for monetary measures (ranking for example), and also to predict monetary measures.

The non-monetary methods of valuing human resources include skills inventory, performance evaluation methods (including ratings and rankings), assessments of potential, attitude measurements and subjective expected utility.

Expected realizable and conditional values can be measured by a ranking method. The probability of maintaining membership can be measured by actual and subjective probabilities. So, non-monetary methods for the valuation of the human resource value are definitely reliable and useful, being applied usually where monetary methods are not available or easy to apply.

The monetary measurement will be dealt with later on in this thesis, but the basic idea is that we have to measure in monetary terms the human resource value in order to translate manpower resources into the common denominator on which many organizational decisions are based. There are for the valuation of individuals, groups and the total human organization different models because each aggregation of human resources is a relevant unit of organizational decision making, and yet no single valuation measure presently developed can validly be used for all three.

Due to the scope of this thesis it will be focused in the valuation of individual's value and costs.

When applying any normative model, the difficulties to assess principal variables suggest the need for surrogate measures, like (1) original costs, (2) replacement costs, (3) compensation, and (4) opportunity costs. These advantages and drawbacks will be presented.

The design and implementation of human resource accounting systems depend upon the organization. Different organizations require different degrees of human resource accounting capabilities. The human resource accounting system I-V will be presented for sake of clarity. There are four major factors which must be considered prior to developing a specific human resource accounting system: (1) type of organization, (2) size and structure of organization, (3) existing human resource accounting capability, and (4) availability of data for developing resource accounting.

It is understood that the levels I to V are successive levels of higher accuracy, but it doesn't mean that an organization can't step into phase III, IV or even V if it has enough accounting capability.

After deciding the level the organization is going to implement, there are five phases in the design and implementation of any system. For illustrative purposes

they are the following: (1) identify human resource accounting objectives, (2) develop human resource accounting measurements, (3) develop a data base for the system, (4) pilot test the system and revise it if necessary, and (5) implement the system in the organization.

What is just presented in this chapter tries to give an overall view of the problem with which we are concerned, its approaches and some constraints.

From the next chapter on, a systematic description of the key points just pointed out will be presented.

II. ROLE OF HUMAN RESOURCE ACCOUNTING IN THE ORGANIZATION

A. SITUATION

The starting point for any human resources accounting system is to identify the kinds of information needed to manage the organization's human resources effectively.

Usually different information will be required at different levels of the organization.

Two questions are pertinent at this stage, as for example: (1) types of decisions that were made regarding personnel problems, (2) the frequency of those decisions, (3) the data that were actually required to make such decisions, and (4) the data typically available.

When we have identified the organization's information needs the next step is to trace costs for the corresponding activities, for a period of some years, as many as possible, which will allow a reasonable basis for projecting expenses for the coming year(s) using statistical treatment of data. This tracing is particularly convenient for activities such as training or recruitment and usually convenient data is available.

Human resource accounting is, as we have seen, a tool designed to assist in the effective and efficient management of human resources. To help understand human resource

accounting's managerial role fully, we will examine a model of human resource management as a system.

This model, shown in Figure 2.1, indicates that human resource management is a system designed to transform human resources inputs into outputs (human services). The inputs are people: individuals, groups, and the total "human organization". The transformation processes are managerial subsystems for acquiring, developing, allocating, utilizing, evaluating and rewarding people.

The outputs are the services provided by individuals and groups. These services are the basis of the value of people to an organization. Thus the model suggests that the ultimate purpose of human resource management is to contribute to the value of an organization as a whole by transforming "raw" human inputs into valuable human outputs.

In this way of appreciating the problem, the cost (expenditure) for an organization of training its individuals has to be understood not literally as an expense but a summation of a real expense due, say, to the wages of the individuals and a capitalization in the amount spent for increasing their skills (training) that will increase the capacity of earnings or more accurately the performation of their jobs, for the organization.

This increased possibility of earnings is of interest in the case of for-profit organizations while the better

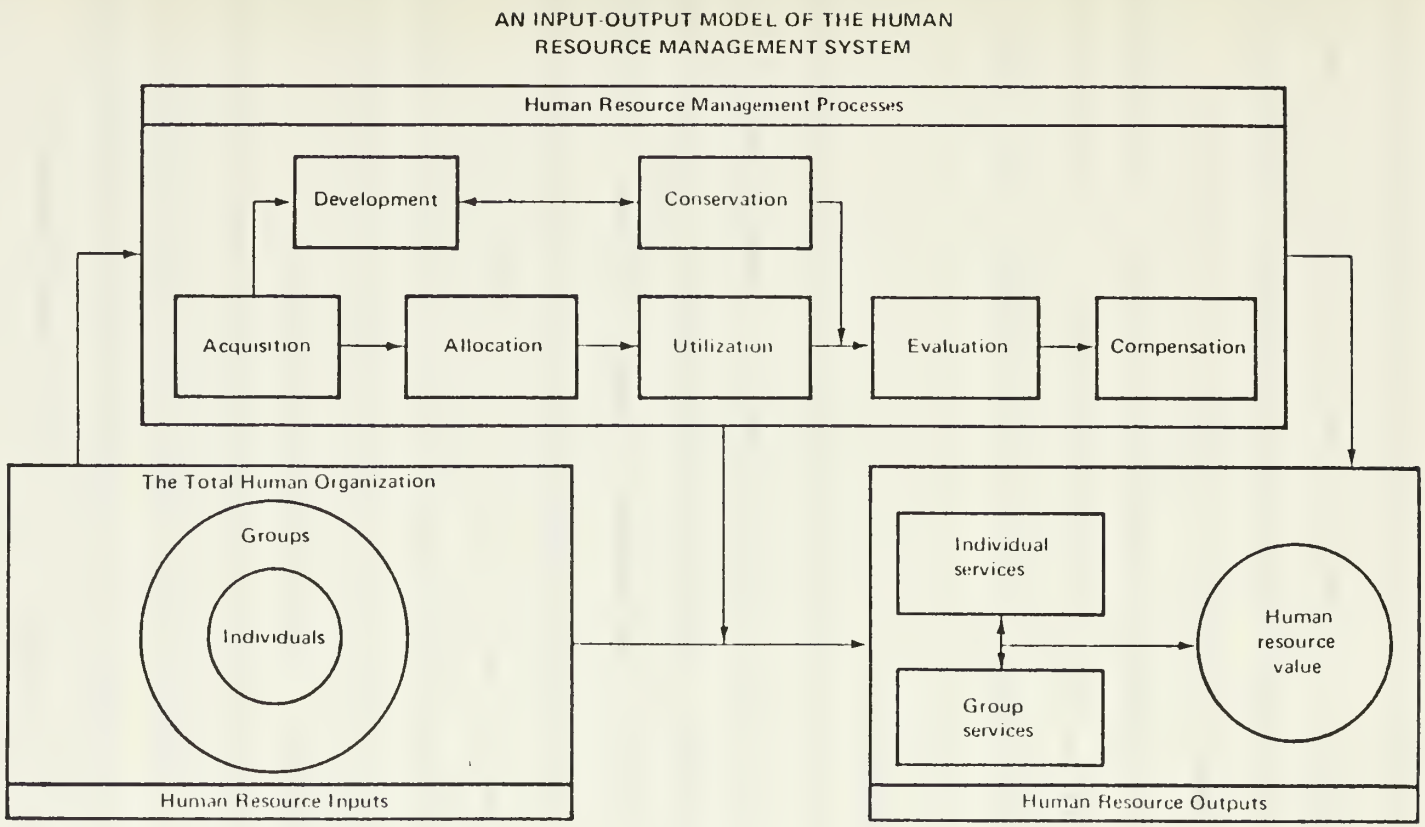


Figure 2.1. Input-Output Model of the Human Resource Management System

performance will be the key aspect in the non-profit organization. So, from management's perspective, the primary role of human resource accounting is to provide information necessary to perform the functions of acquiring, developing, allocating, conserving, utilizing, evaluating, and rewarding human resources. Different types of information are needed by management so that it can help in the human resources transformation process. We will see how human resource accounting can help management with these functions.

1. Acquisition

Acquisition of human resources involves recruiting, selecting, and hiring people to meet the organization's present and expected future manpower needs. This process includes forecasting the manpower requirements. In fact this is just a process of cost estimation, that includes one manpower acquisition budget. This knowledge helps in defining standard costs of recruitment, selection, and hiring of people, useful for preparing future manpower acquisition budgets. Also selection of people can be helped by human resource accounting, although for the moment it's still difficult to have measurements of the (future) expected value of people, except in terms of non-monetary surrogates such as scores or tests of "management potential."

2. Training

Development of human resources involves various forms of training designed to enhance the technical, administrative, and interpersonal skills of people. This in turn increases their value to an organization.

Training can be formal (school) or on-the-job. For each proposed training program management has to assess its value, and the estimated cost of the proposed expenditure. The former is a resource allocation (human capital budgeting) decision, while the latter is a problem of cost estimation. Human resource accounting can help facilitate decisions involving the allocation of resources to human resource development by measuring the expected rate of return on proposed investment. The data for this analysis would be provided by human resource accounting.

3. Acquisition and Development Policy

Acquisitions and development policy can also be supported by human resource accounting. The question of training existing individuals in the organization versus hiring (recruiting) experienced personnel from the outside can be answered by human resource accounting, by providing estimates of the historical and current costs to acquire and develop people for the different positions.

Management can assess the trade-offs between the costs of recruitment from outside and development from

within, and based on that economic information, decide the issue formulating in this way the personnel acquisition and development policy.

4. Allocation

The allocation of human resources is the process of assigning people to various organizational roles and tasks. There are some (some times conflicting) objectives involved in allocation decisions. Obviously, the task has to be performed in the most efficient way. This may indicate that management will allocate "the most qualified" person to a particular job. But the organization's human resources must be developed, and management may wish to provide people with the opportunity to develop their skills in on-the-job learning. This suggests that "the most qualified" (experienced) person will not always be allocated.

Also management must try to allocate people to jobs that satisfy their needs. In fact management should allocate people to jobs trying to optimize three variables: job productivity, human resource development, and individual's satisfaction.

Human resource accounting can be useful to management in this allocation issue, quantifying the variables involved in the allocation decisions and express them in the common denominator of monetary units. This will help management understand the trade-offs involved and select the optimal course of action.

Furthermore, since the variables can be quantified, this optimal solution can be found through linear programming. Management must be aware that suboptimal decisions can be costly to individuals and society as a whole, as well as to organizations.

Organizations can actually deplete the value of their human assets by failing to assign people to jobs in which they can develop their skills.

5. Conservation

Conservation of human resources is the process of maintaining the capabilities of people as individuals and the effectiveness of the system developed by an organization. The organization's human resources may take several forms, such as the technical capabilities of individuals or an effective functioning management team (a human organization).

As William A. Paton observed [Ref. 2], "in the business enterprise, a well-organized and loyal personnel may be a much more valuable asset than a stock of merchandise."

Unless systematically monitored and maintained the capabilities of human resources may deteriorate. Failure to achieve this goal can be costly to the organization.

Currently an organization's conservation of its human resources typically is measured in terms of turnover

rates, but this measure is inadequate because: (1) they are historical and therefore unavailable to management until after turnover has occurred, and (2) turnover rates do not fully represent the economic impact of turnover, which is more realistically represented by monetary measures.

Human resource accounting can assist management in conserving its human organization by providing an early warning system. It can measure and report certain (social, psychological) indicators of the condition of the human organization, and management can assess trends in these variables prior to the actual occurrence of turnover.

6. Utilization

Utilization of human resources is the process of using human services to achieve organizational objectives. Human resource accounting can help managers utilize human resources effectively and efficiently by providing a conceptual framework for human resource utilization.

At present there is a lack of a unifying framework to guide the management of human resources in the organization. Managers have neither a valid criterion to guide decisions affecting people, nor a methodology for assessing the anticipated or actual consequences of such decisions.

B. CRITERIA OF PRODUCTIVITY

Criteria of productivity, satisfaction and the trade-offs between alternatives have been impaired by the difficulties to measure productivity and satisfaction.

One possible solution to these problems is to establish a criterion based on the notion of human resource value. This notion can serve as the raison d'etre of human resource management and simultaneously provide the goal and the criterion for the management of human resources.

In this scope the aim of human resource management can be viewed as the need to contribute to the value of the organization as a whole by optimizing the value of its human assets; the effectiveness criterion can be the measured change in the value of the organization's human resources.

This means that task design, selection, role assignment, development, performance appraisal, and compensation are not merely a set of service functions to be performed, but rather a set of available strategies that can be adopted to change the value of human assets and, in turn, the value of the organization as a whole. So, this means that managers will have a theoretical framework to guide their thoughts, actions, and decisions with regard to people.

This framework involves thinking of human resource acquisition, development, allocation, and conservation as strategies designed to influence the value of people.

1. Evaluation and Reward of Human Resources

Human resource evaluation is the process of assessing the value of people to an organization. It

involves measuring the productivity (performance) and promotability of people. At present human resources are typically evaluated by non-monetary methods discussed later on.

Because these methods cannot be used in most of the human resource acquisition, development, allocation, and conservation problems and decisions, monetary methods of human resource evaluation are needed instead. The development of valid and reliable (monetary and non-monetary) methods of measuring the value of people to an organization can be helped by the human resource accounting.

Having the availability of these methods, human resource management decisions can be made on a cost-value basis.

Rewards include compensation, promotion, and symbolic rewards such as performance appraisals. Human resource accounting will permit rewards to be granted accordingly to a person's value to an organization.

2. Evaluation of Personnel Management

Another field where human resource accounting can be used is in evaluating the efficiency of the personnel management function per se. It can help establish standard costs of acquiring and developing people, and compare these standards with actual costs the personnel department incurs in performing its acquisition and development functions.

The variances (deviations) from standard may be analyzed to identify possible inefficiencies in the manpower acquisition and development process.

C. IN SHORT...

In short, human resource accounting has a dual purpose: (1) it is a way of thinking about the management of an organization's human resources, based on the notion that people are valuable organizational resources, and that human resource management decisions must be based on a cost-value calculus, and (2) it is also a system of providing management with the information needed to manage human resources effectively and efficiently.

It provides information about the cost and value of people to an organization with the specific needs of a given organization determining the types of information provided.

III. HUMAN RESOURCE COSTS

A. CONCEPTS OF COST AND MEASUREMENT METHODS

1. Accounting Concepts of Costs

Accounting uses the concept of cost in a variety of ways. References are made to historical cost, acquisition cost, outlay cost, replacement cost, current cost, direct and indirect costs, standard cost, incremental cost, sunk cost, fixed and variable costs, marginal cost, and opportunity cost, to mention just some of the more common ways in which the term cost is used.

Formally defined cost is a sacrifice incurred to obtain some anticipated benefit or service. A cost may be incurred to acquire tangible or intangible objects.

Conceptually, all costs have "expense" and "asset" components, as stated by Eric Flamholtz [Ref. 3].

Conventionally defined an expense is the portion of a cost that has been consumed during the current accounting period. An asset is the portion of a cost that is expected to provide benefits during future accounting periods.

A fundamental problem is to measure the asset and the expense part of costs.

Several concepts of cost are of considerable importance to human resource accounting. Two of these concepts are original and replacement costs.

Original costs refer to the sacrifice that was actually incurred to acquire or obtain a resource. This is typically called "historical costs". Replacement costs refer to the sacrifice that would have to be made today to replace a resource presently owned or employed.

Another pair of cost concepts that are important are outlay and opportunity costs. Outlay and opportunity costs are components of original (historical) and replacement costs.

An outlay cost refers to the actual cash expenditure that must be incurred to acquire or replace a resource. An opportunity cost refers to the income or revenue foregone or sacrificed in order to acquire or replace a resource. It is literally a measure of a lost or foregone "opportunity" to earn revenue. In other words an opportunity cost refers to the benefits that must be sacrificed in order to use a resource in an alternative way.

Also of interest for human resource accounting are the concepts of direct and indirect costs. Direct costs refer to the costs which can be traced directly to a specific activity, product, or resource. Indirect costs are costs that cannot be traced directly to any specific activity, product, or process, but which are incurred for general use in more than one activity, etc.

This class of cost may be assigned or allocated to specific products or activities, on the basis of certain

assumptions about the relationship between the activity and the indirect costs. Many of these allocations are based upon rules-of-thumb and may be quite arbitrary.

Another pair of terms is of interest: actual and standards costs. These two terms try to distinguish between what costs are and what they ought to be. Standard costs are the costs that ought to be incurred to attain some specific end under certain predefined conditions. Thus the standard cost is a hypothetical one, a target for what costs ought to be. Actual costs are the costs actually incurred to attain some specified end.

2. Concepts of Human Resource Costs

All the concepts just discussed have their counterparts in human resource accounting.

The notion of "human resource cost" is derived from the general notion of cost. Human resource costs are costs incurred to acquire or replace people (in fact since people cannot be "owned", we must understand this phrase as "acquire or replace the services provided by people"). Like other costs they have expense and asset components. They may be comprised of outlay and opportunity costs and they may have both direct and indirect cost elements. In addition it is possible to account for standard as well as actual human resource costs. Finally, the conventional accounting concepts of acquisition and replacement costs have counterparts in human resource accounting.

a. Original Cost

The original cost of human resource refers to the sacrifice that was actually incurred to acquire and develop people. This is identical to the concept of original cost for any other asset. Typically the original cost of human assets includes costs of recruitment, selection, hiring, placement, orientation, and on-the-job training. Some of these items are direct costs while others are indirect costs. For example, the cost of a trainee's salary is a direct cost of training while the cost of a supervisor's time during training is an indirect cost.

The purpose of collecting these costs will influence their components. For managerial purposes, it is desirable to include opportunity costs incurred in the original cost of human resources. However, because there are often difficulties involved in measuring opportunity costs, it may not be feasible to obtain objective estimates.

b. Replacement Cost

The replacement cost of human resources refers to the sacrifice that would have to be incurred today to replace human resources presently employed. If an individual were to leave an organization, costs would have to be incurred to recruit, select, and train a replacement.

The replacement cost of human resources typically includes the cost attributable to the turnover of

a present employee as well as the cost of acquiring and developing a replacement. It includes both direct and indirect costs. Since replacement costs are intended for managerial uses, they should include opportunity costs as well as outlay cost components.

The notion of "human resource replacement cost" can be extended to individuals, groups of people and to the human organization as a whole. Due to the scope of this thesis the presentation will be restricted to individual's replacement costs.

This is also the way managers typically think when there is a need for replacing someone in the organization.

Actually, replacement costs can be understood in two ways: (1) the cost of acquiring a substitute capable of rendering an equivalent set of services for a single specified position or (2) the cost of acquiring a substitute per se.

These two notions of replacement costs are called: (1) positional replacement cost and (2) personal replacement cost.

In this context positional replacement cost refers to the sacrifice that would have to be incurred today to replace a person presently employed in a specific position, with a substitute capable of providing an

equivalent set of services in that given position. Personal replacement costs refers to the sacrifice that would have to be incurred today to replace a person presently employed with a substitute capable of rendering an equivalent set of services in all the positions the former might occupy.

B. MEASUREMENT OF HUMAN RESOURCES COST

1. Original Costs of Human Resources

Original cost of human resources was defined as the sacrifice that was incurred to acquire and develop people. The two basic elements of original cost are acquisition costs and learning costs. Each of these elements has both direct and indirect costs components. Figure 3.1 shows a tentative model for measurement of original human resource costs.

a. Acquisition Cost

Acquisition costs refer to the sacrifice that must be incurred to "acquire" a new position holder. They include all of the direct costs of recruitment, hiring, and replacement, as well as certain indirect costs.

(1) Recruitment Costs. Recruitment costs are costs incurred to identify possible sources of human resources, including those both inside and outside an organization. They are also incurred to attract possible future members of an organization. The major components of external recruitment costs are advertising, eventual college

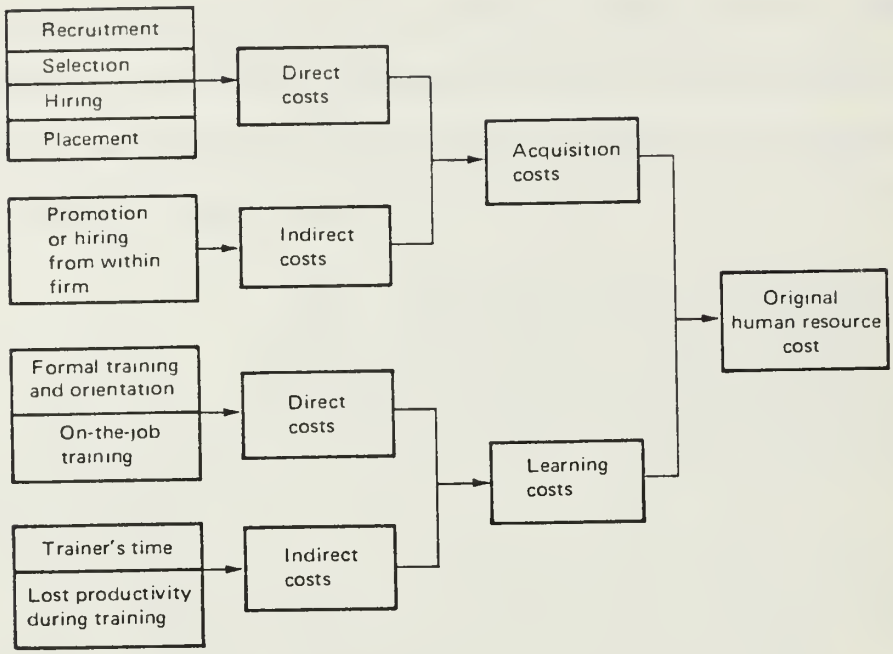


Figure 3.1. Model for Measurement of Original Resource Cost

recruitment, employment agency fees, entertainment, travel, and administrative expenses. The costs attributable to people who are not actually hired should be treated as costs of recruiting the people actually hired, that is, they should be allocated to the person(s) hired.

(2) Selection Costs. Selection costs are the costs incurred to determine who should be offered employment. They include all costs incurred in selecting people for membership in an organization, like costs of

interviewing, testing, and the administrative costs of processing applicants. The magnitude of these costs per employee will vary directly with the organization level of the position to be filled.

(3) Hiring and Placement Costs. Hiring and placement costs are the costs incurred to bring an individual into an organization and place him in the job. They normally include a variety of administrative costs incurred to place the individual in the job. In practice, they are all taken together in a single classification because their purpose is the same, bring an individual into the organization and into a position.

b. Learning Costs

Learning costs refer to the sacrifice that must be incurred to train a person and bring him to the level of performance normally expected from an individual in a given position. Both direct and indirect costs are present in the formal orientation and training as well as on-the-job training. The direct costs involve the expense of formal training programs, including trainee and trainer salaries. The indirect costs include the opportunity cost of lost performance of others in addition to the trainee, which may result because the interaction of others with the trainee during his learning tends to decrease their productivity.

(1) Formal Training. Formal training and orientation costs are the ones associated with formal

indoctrination and training. The orientation is understood as the process of becoming familiar with personnel policies, company products (if it is the case), facilities and so on. Formal training can span from a very simple instruction required to show a person how to do a repetitive job to a highly specialized program lasting for weeks, months, or eventually years.

(2) On-the-Job Training. On-the-job training costs are incurred in training an individual on the job itself rather than in formal training programs. On-the-job programs are used for jobs needing a deep contact with the process involved, as for example factory, work shops, accountants, etc. The major cost for this training is the cost of trainee's salary while he is improductive.

Trainer's time cost is the cost of supervisory salaries during the period of training. The time supervisors spend in training should be treated as cost of training.

Lost productivity during training is the cost of lost performance of people other than the trainee during the training period. Until an individual achieves the normal level of productivity expected of someone in his position, others may be affected. The lost productivity of these others must be attributable to training.

Training cost measurement is based on the differential of actual productivity of the trainee and the standard productivity for the job he is in.

People take time, which amount depends on the complexity of the job, to attain the standard productivity. The difference between actual and standard productivities, must be attributable to learning costs and so to training costs. Figure 3.2 shows an example of a trainee that only achieves standard productivity after ninety days of learning. This cost of learning is essentially an investment made by one organization to develop its technicians. It is an investment in human assets.

2. Measurement of Replacement Costs of Human Resources

As already defined, the concept of replacement costs of human resources is the sacrifice that would have to be incurred today to replace human resources presently employed. (Figure 3.2 shows a tentative model for the measurement of human resource replacement costs.)

We also noted that there is a dual notion of replacement costs: positional and personal.

Although the focus of this thesis is the personal replacement costs, we shall refer briefly to what is positional replacement cost, since personal replacement cost is an extension of this concept.

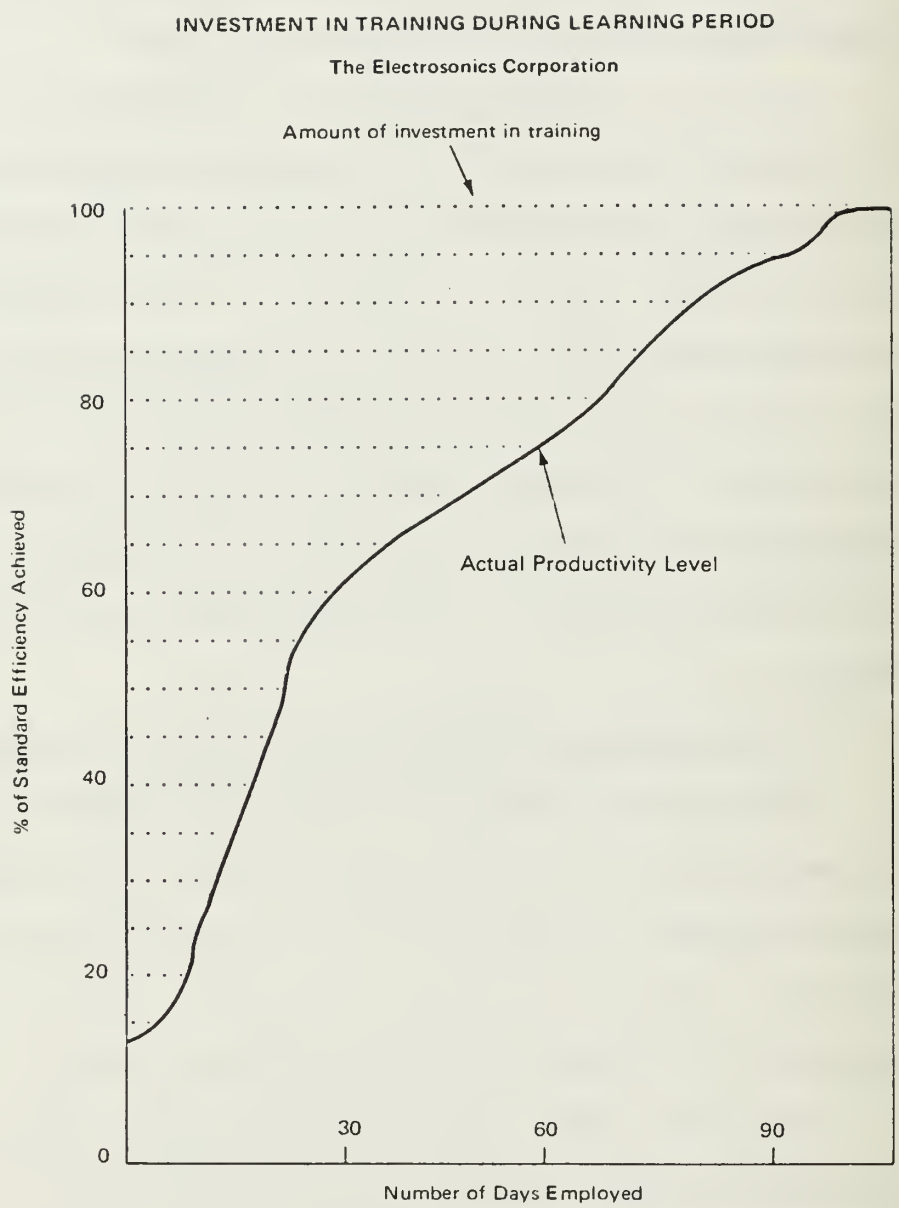


Figure 3.2. Investment in Training During Learning Period

a. Positional Replacement Cost

As shown in Figure 3.3, there are three basic elements of positional replacement costs: (1) acquisition costs, (2) learning costs, and (3) separation costs. The first two of these costs have been discussed previously; the third will be examined below.

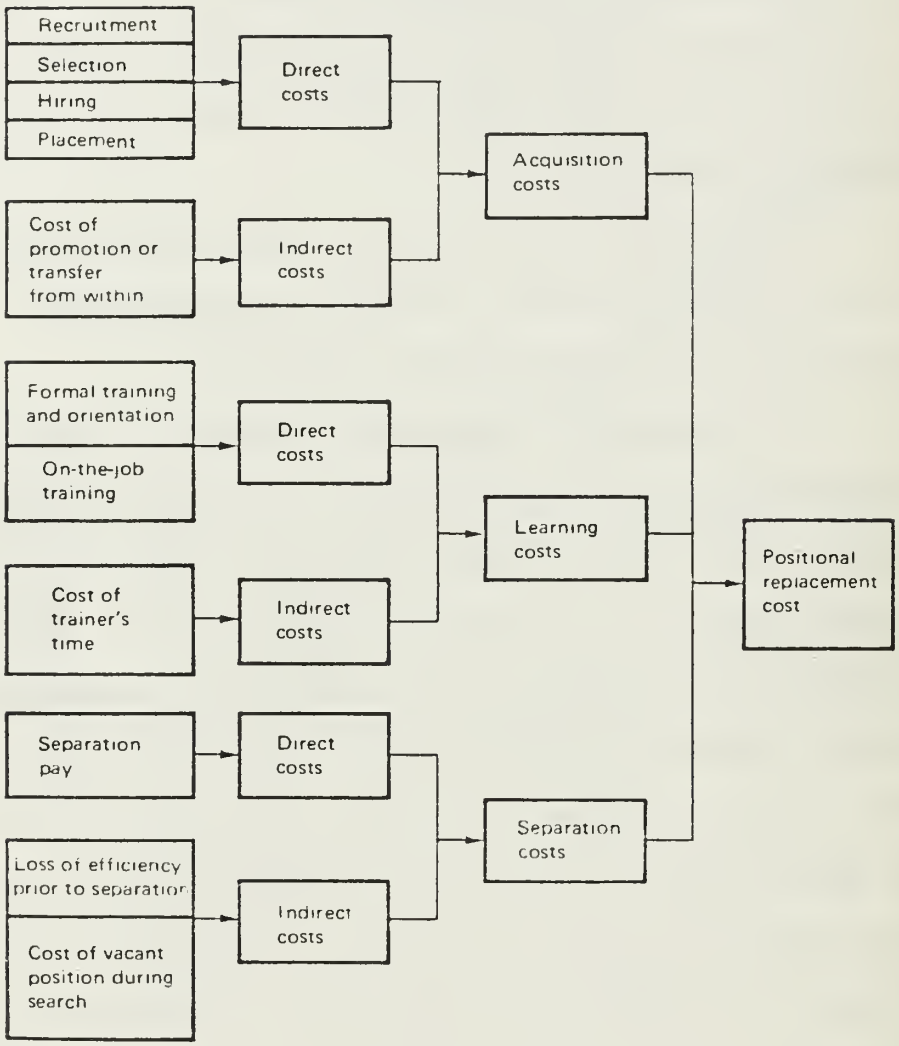
Separation costs are the costs incurred as a result of a position holder leaving an organization. It may include both direct and indirect components.

The indirect cost can be incurred because the responsibilities of the vacant position are not being performed. It can have a chain effect of lost performance, if the performance of the vacant position has an impact in the performance of others. This particular difference of performance can be conceived as the cost of a vacant position. Another element of separation costs is the cost of lost productivity of the ones in search of the new position holder, as also of the individual leaving assuming that there is a tendency for decreasing performance at such a time.

b. Personal Replacement Cost

The concept of personal replacement cost refers to the sacrifice that would have to be incurred today to replace a person with a substitute capable of providing a set of services equivalent to that of the individual being replaced.

MODEL FOR MEASUREMENT OF HUMAN
RESOURCE REPLACEMENT COSTS



SOURCE. Eric G. Flamholtz, "Human Resource Accounting: Measuring Positional Replacement Costs," *Human Resource Management*, Spring 1973, p. 11. Reprinted by permission of the Graduate School of Business Administration, University of Michigan.

Figure 3.3. Measurement of Human Resource Replacement Costs

Since the Navy can assign very different billets to the same individual, this is the cost of interest for accounting for the Navy personnel replacement cost. So the definition just stated refers to the cost of replacing a person with a functionally equivalent substitute rather than the cost of replacing him with the best available substitute.

In principle the concept of personal replacement cost can be extended to individuals, groups, and over the total human organization.

The notion of personal replacement cost is quite similar to the concept of economic value. This similarity is intentional. Since this personal replacement cost (and the related concept of human resource value) is the one of interest in the scope of this thesis it will deserve a special treatment in a coming chapter devoted to the accounting of human resource value.

C. ACCOUNTING SYSTEMS FOR HUMAN RESOURCE COST

The concern for evaluating human resource costs arose in the late 60's, when business firms began to apply the concepts of human resource accounting to their own operations. Two main streams of thought created two different ways of looking at this problem: (1) accounting for investments in human resources and (2) accounting for the replacement costs of their human resources.

Accounting for investment in human resources calls for looking at those investments as assets to be capitalized and amortized over their expected useful life rather than as an expense in the period incurred. The firms that choose this approach usually report this data in financial reports. Later on these firms also develop systems for managerial purposes (internal reports), in industrial as well as in service organizations.

Although the scope of this thesis is more concerned with replacement costs in a Government Department (Navy), I feel that an overview of the firm's accounting for investments in human resources will help in figuring out a more complete scenario of the human resource accounting problem because the military applications were derived from the civilian world.

1. Accounting for Human Resource Investment Costs

Human resource investments are essentially historic, meaning that they have been already incurred when they are accounted for.

As we have already noticed, different systems may well be required by firms in different industries, or organizations of varying sizes, etc.

A set of concepts and procedures must be developed for measuring recruitment, acquisition, training, development, and other costs incurred as investments in human assets.

The interest of any organization in accounting for its human resources is usually attributable to three interrelated factors: (1) the economics of the business in which the firm operates, (2) the company managerial philosophy, and (3) certain perceived limitations of conventional accounting.

This interest arises in organizations that are people intensive. People intensive firms are more prone to accept and initiate human resource accounting systems than equipment-intensive industries for the simple reason that their major assets are people.

Recognizing the crucial role played by human resources in its industry, management adopts a philosophy based upon the premises that people are valuable organizational resources. It should be noted, however, that the company's managerial philosophy shall not treat people as the only important resource, rather that people must be viewed as an integral part of a mix of resources.

Some firms even believe that there are three kinds of assets: (1) human assets, (2) customer loyalty assets (a kind of goodwill), and (3) physical assets, and that it is management's job to plan, organize, and control these three types of assets. Furthermore, it should manage the profit in such a way as to remain solvent.

In this totem there will be five key "result areas" for which managers should be responsible: (1) profit, (2)

solvency, (3) physical resources, (4) human resources, and (5) customer loyalty resources.

Normally a firm's management does not receive sufficient information to effectively manage its human resources. The usual accounting information system doesn't provide the information required to facilitate certain decisions involving human resource planning and utilization, nor does it usually provide management feedback to permit the evaluation of the firm's effectiveness in utilizing its human resources.

In the business world managers are influenced by the kind of feedback they receive about their performance. It's also only normal that people tend to direct attention toward the aspects of their performance on which they are evaluated. So, the absence of human resources reports will drive management to overlook it, in profit reports or other areas where its performance is already monitored like reported net income, etc.

We have to recall here that the normal accounting system defines and reports as expenses all the expenditures in personnel, even if they are for training and improvement of its personnel skills. In human resource systems reports these particular values are reported as assets, then the net income reported will be smaller. If the firm's way of thinking disregards the human asset's improvement the

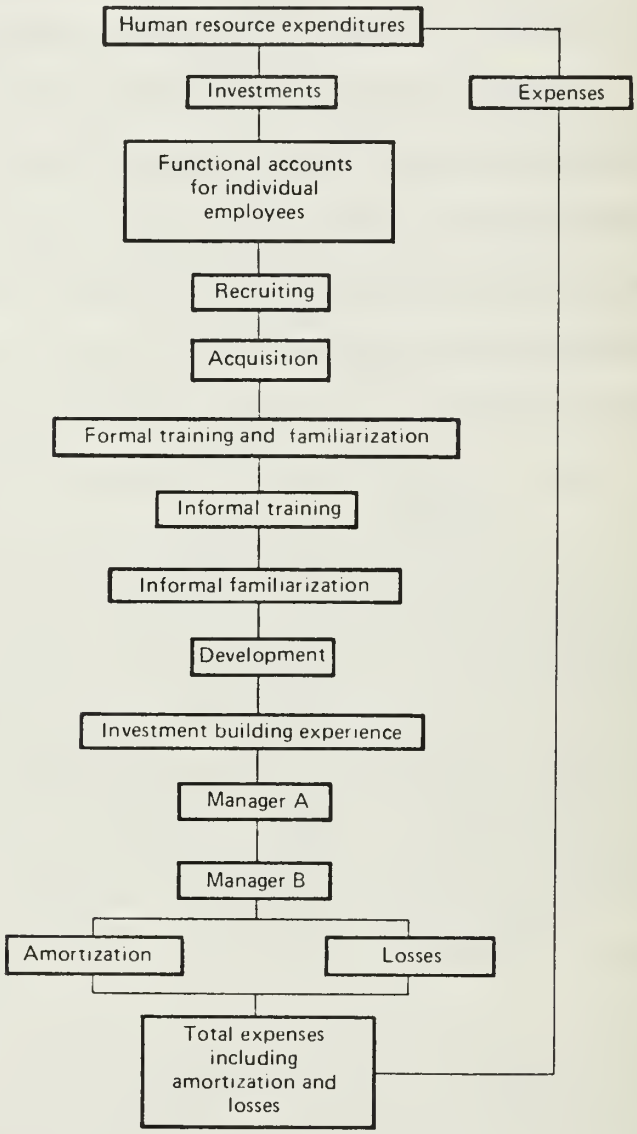
particular manager who emphasized the human resource systems will be ranked lower than his counterparts because he presented a lower net income for operations.

This reasoning can force, for example a manager to sacrifice long term profitability for short term increases in reported net income by either "driving" people, or eliminating training expenditures. If this happens, it will be unnoticeable because there is no way to monitor the economic impact of such a mismanagement.

a. A Tentative Example of Accounting for Investment Costs

One of the systems developed to account for the investment made on people for an organization is shown schematically in Figure 3.4. This case refers to a manufacturing firm whose total costs were initially classified in two components: human resource costs and other costs. The human resource costs were further separated into their expense and asset components. For a cost to be treated as an asset, it must be expected to provide benefits to the company beyond the current accounting period. If the benefits are expected to be fully consumed during the current period, it is treated as an expense. The human assets are then classified into functional categories such as recruiting, acquisition, informal training, and development. These functional costs are then traced to specific individuals and recorded in individualized accounts

SCHEMATIC MODEL OF HUMAN RESOURCE ACCOUNTING SYSTEM
FOR INVESTMENTS IN INDIVIDUALS AT R.G. BARRY CORPORATION



SOURCE: Adapted from William C. Pyle, "Implementation of Human Resource Accounting in Industry," in R. Lee Brummet, Eric G. Flamholtz, and William C. Pyle (editors), *Human Resource Accounting. Development and Implementation in Industry* (Ann Arbor: Foundation for Research on Human Behavior, 1969), p. 43. Reprinted by permission of Foundation for Research on Human Behavior.

Figure 3.4. Schematic Model for Investments in Individuals

for department. These assets (investments) are then depreciated over their expected future service life.

In the example shown, several functional accounts (categories) differ from the model presented in Figure 3.1 due to the fact that the firm in this particular example differentiated the broad categories of acquisition and learning costs into several finer components.

b. Data Collection

Trying to collect data, in this case historical costs incurred as investments in the company's human resources, sometimes turns out to be unfeasible. When historical costs are not available the model can be used to account for future investments in people, based on estimates of actual past expenditures. In this case standards for the different functional areas can be developed and corrected as more reliable data is being provided (with time). Based on these standards initial balances of the human resources can be developed, and from this point in the system will work based on the annual change of the same.

Usually the old accounting procedures must be modified to report human resource costs, and new forms for collecting needed data must be enforced.

Investments in human resources are depreciated over their expected useful life. Certain items as recruiting and acquisition costs are depreciated over the

expected organizational tenure of the individual because they are expected to provide benefits as long as the person remains in the organization. Other items such as training and development are depreciated over the period of expected utility which is typically less than the person's expected tenure.

Individual employee asset accounts shall be reviewed periodically to determine whether obsolescence or health deterioration warrants recognition of a loss of human assets. Obsolescence is a very difficult factor to assess, and it is a judgement factor. When turnover occurs the undepreciated balance of a person's account is written off as a charge to current earnings.

After implementing a human resource accounting system, management will be provided with several types of data that were not available previously, like typical investments made on people in each class. This information can be used in planning and controlling certain personnel activities as well as in strategic planning, as discussed subsequently. The system also provides management with information on the investments being made in different human resource management functions such as recruiting, training, and on-the-job training. Also the turnover cost can be assessed and reported.

The advantages of the system are the ready availability of reliable data where to base decisions, using historical data for estimating future costs.

The system is also useful in strategic planning for the company as a whole. Instead of basing decisions on the usual return on assets or return in investments (without human resource accounting), when developing relations to profits, managers base their decisions in relationships that account for all resources (tangible and human). So the expected return on investments in all resources (human as well as conventionally defined assets) is the criterion for strategic decision making.

The human resource accounting system helps management implement this concept by providing data about human resource costs which are essential inputs to this criterion.

The system is also very useful in controlling in two different but related control functions: (1) to motivate managers to conserve (or, more properly, not to unnecessarily liquidate) the organization's human assets, and (2) to provide a means of evaluating management's conservation of its human resources.

Interrelated with this last problem was the possibility of rewarding managers for "spurious" profits, obtained in fact by the liquidation of his human or customer

loyalty assets. As an example managers can pressure subordinates in order to increase current profitability at the expense of losing their long term motivation and loyalty. As a result of being "driven", people might become increasingly dissatisfied and leave the organization. Thus a manager might show increased earnings (to "look good") while he was actually liquidating the company's human assets and, accordingly diminishing long term profitability. In a conventional accounting system there is no way of preventing these potentially unintended dysfunctional effects of a measurement system. It can be avoided by the existence of a human resource accounting system.

Still another potential major control function of this system is to provide a means of evaluating the personnel department's efficiency. Specifically, the cost standards for the addition and replacement of people can be compared with actual costs. Variances, if any, should be explained.

The drawbacks of this system reside in (1) the reliability of the cost-data used as inputs (in the absence of historical costs data, estimates were used), (2) the validity of the taxonomy applied (the greater the number of classifications of costs, the greater the difficulties to measure costs), and (3) eventual utility for managers (most of the advantages were hypothesized).

Due to the newness of this branch of knowledge, there are few reports on the whole subject, but at least the concern for human assets rose in the firms where it was experimentally applied.

Other systems can use different variables, like outlay costs and opportunity costs, and time analysis reports can be also used for the allocation of people's working hours as well as "summaries of human resource investments" (usually for one year) and statements of human resource flows (also during one year).

2. Accounting for Human Resource Replacement Costs

At present there are very few organizations with systems for accounting for the personal replacement costs of human resources. Most of them have developed systems for positional replacement costs rather than personal replacement costs. Anyway we will overview a system of human resource positional replacement cost accounting.

In this example of one medium size mutual insurance company, one of the major reasons for the company's interest in accounting for the replacement costs of its human resources was the high rate and cost of turnover among salesman.

Typically the highest turnover was in the first year of salesmen employment (1/3). The organization was interested in measuring the cost in replacing the salesmen, and the potential costs savings from reducing turnover.

The measurement of positional replacement costs was based upon the model discussed in this chapter (Figure 3.3). The measurement procedure was assessed as having face validity to management, i.e., mangement believed it was a valid system.

Some of the data required was collected from objective sources such as historical records, time sheets, and wage rates. However, it was necessary to obtain subjective estimates of other data such as the amount of time people spent in on-the-job learning, the percentage of decreased productivity of other employees when a position is vacant during a search for a replacement, and the probability of replacing a specified position-holder by a transfer, a promotion, or from outside the organization.

The estimates were given by the people that management trusted more and when feasible the estimates were obtained from two or more persons to assess their validity. So the estimates had face-validity to the management since they were made by "the best available source of data" and in this way they were supposed to be the best data available.

Anticipated positional replacement costs refer to the cost actually expected to be incurred to acquire "the best available substitute", which may or may not be "the most desirable substitute".

Standard positional replacement cost refers to the cost to replace an individual, assuming he is replaced by the "natural" or "most desirable" substitute.

The difference between these costs may be attributable to differences in the amount of training required by the two alternative substitutes to replace the position holder effectively.

When using the best available substitute to fill a vacant position, the costs are higher than when using the most desirable substitute because there is extra training and learning involved. Also there is an increased separation cost due to the extra time of decreased performance due to a greater time the new employee is going to take until he performs his function correctly. Eventually a chain effect will decrease performance depending on the rank of the job just filled.

This system for accounting for positional replacement cost has both direct and indirect uses in the human resource accounting process. It can be helpful in (1) controlling the use of human resources and (2) developing surrogate measures of a person's value to the organization. The former use will be examined below, while the second is treated in Chapter V.

Measures of positional replacement costs can play a significant role in budgeting manpower requirements, in

controlling personnel acquisition, learning and separation costs, and in evaluating the effectiveness of manpower planning policies and practices.

The process of personnel planning not only involves forecasting the number of people required in various staff's classifications, but also calculating the monetary costs of recruiting, selecting, hiring, and developing manpower resources in terms of personnel budget.

Anticipated and standard positional replacement costs can facilitate the preparation of such budgets. In addition standard positional replacement costs can help control personnel costs. Thus the personnel function in organizations can be treated as a cost-center, with standard costs to act as criteria for cost control. The comparison of standard and anticipated costs can also serve as a means of monitoring the effectiveness of manpower planning policies and practice. One of the usual reasons for these differences is the difficulty of obtaining the natural (most desirable substitutes). In other words the organization is incurring an opportunity cost attributable to manpower planning practices, and the amounts involved can reach easily hundreds of thousands of dollars.

The drawback of the system is the reliability of some of the data used to obtain measures of positional replacement costs. The subjective estimates necessary, must

be observed as first approximations and their reliability must be assessed. Future research is needed in this field.

Another area of future study is the impact of positional replacement cost on management decision making. There is not yet enough data to assess a valid opinion on the subject.

IV. HUMAN RESOURCE VALUE

A. CONCEPTS AND THEORETICAL FRAMEWORK

As we have seen the concept of human resource value is central for the assessment of human resource replacement cost of one organization.

Thus, one of the major objectives of human resource accounting is to develop valid and reliable methods of measuring the value of an organization's human resources.

Human resource values can be measured in two broad classes of valuation: (1) monetary and (2) non-monetary. Both measures are needed for use in (1) decision making involving the acquistion, development and allocation of human resources, and (2) monitoring and evaluating the degree to which management has effectively and efficiently utilized human resources.

Prior to developing methods of measuring human resource value, it is necessary to understand what human resource value is and to identify the factors influencing its magnitude and fluctuations which determine the value of people and their interrelationships.

So let's develop a theoretical framework that explains the nature and determinants of the value of people to organizations. This framework is called "human resource

value theory". It draws upon economic, social, and psychological variables.

1. Economic Concept of Value

The concept of value, despite its many applications has essentially two different meanings: (1) the usefulness of a particular resource, and (2) the power of purchasing goods which possession of that resource facilitates. In short, one type of value is utility and the other is purchasing power, being termed the first as "value in use" or "use value" and the latter "value in exchange" or "exchange value".

In the economic theory the value of any "object" is the perceived ability to render future economic "utility" "benefits", or "services". Fisher [Ref. 4] proposed that:

> "...the buyer of any article of capital, values it for its expected services to him, and the price he will pay for it is the equivalent to him of these expected services, or in other words, is their 'present worth', their 'discounted value' or 'capitalized value'".

An object incapable of rendering future economic services has no value. So, an object's value is typically defined as the "present worth of the services it is anticipated to render in the future."

The concept of human value is derived from general economic value theory. People possess value because they are capable of rendering future services. So, the value of people can be defined in principle, as the present worth of their expected future services. This concept can be

extended to individuals, groups, and the total human organization.

More formally, the individual value to an organization can be defined as the present worth of the set of future services he is expected to provide during the period he is anticipated to remain in the organization.

2. Determinants of an Individual's Value

The determinants of an individual's value must be detected, for basing a model on them. For the same reason interrelationships between them must be detected. This model is rather complex.

Unlike other resources, human beings are not owned by the organizations, and hence they are relatively free to either supply or withhold their services. From an organizational viewpoint, this means that the probability of realizing an individual's services is typically less than certainty. Thus this also suggests that there is a dual aspect to an individual's value: (1) the amount the organization could potentially realize from his services if he maintains organizational membership during the period of his productive service life, and (2) the amount actually expected to be derived taking into account the person's likelihood of turnover. The former is the individual's "expected conditional value", and the latter is the person's "expected realizable value". The ultimate measure of a

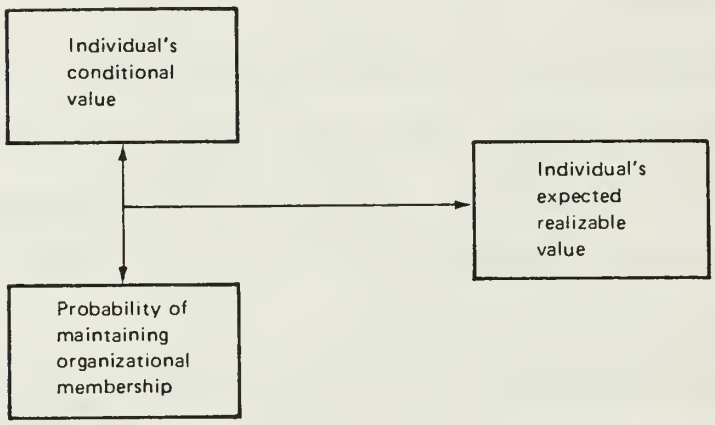
person's value to an organization is expected realizable value, because it is equivalent to the general notion of a resource's economic value, the present value of its expected future services.

An individual's expected realizable value to an organization is thus multidimensional and composed of two interacting variables: (1) the individual's conditional value, and (2) the probability that the individual will remain in the organization.

An individual's conditional value is the present worth of the potential services that could be rendered to the organization, if the individual maintained organizational membership throughout his expected service life. The probability that the individual maintains membership is the complement of the probability of turnover or exit. It determines the extent to which the organization will realize the individual's potential services or conditional value. The product of these two variables is thus the individual's expected realizable value, the present worth of services actually expected to be derived during the individual's anticipated tenure in the organization.

Figure 4.1 gives a tentative approach to the relationship of individual's determinants to conditional value.

VARIABLES INTERACTING TO PRODUCE AN INDIVIDUAL'S EXPECTED REALIZABLE VALUE



SOURCE: Eric Flamholtz, "Toward a Theory of Human Resource Value in Formal Organizations," *The Accounting Review*, October 1972, p. 669. Reprinted by permission of *The Accounting Review*.

Figure 4.1. Variables of Expected Realizable Value

3. Conditional Value

The individual's conditional value is a multi-dimensional variable composed of three factors: productivity, transferability, and promotability.

Productivity refers to the set of services an individual is expected to provide while occupying his present position. A synonym for productivity is performance, and it should be noted that the model implicitly assumes that the services embodied in these variables are net of costs incurred to generate these services.

Transferability is the set of services an individual is expected to provide if and when he transfer to other positions at the same position level in a different promotion channel. By the Navy standpoint, it will be the set of services an individual is expected to provide in any assigned billet within the same rank.

Promotability represents the set of services the individual is expected to provide if and when he occupies higher level positions in his present or different promotion channels.

Productivity, transferability, and promotability are, in other words, subsets of the "services" the person is expected to render, which are the elements of conditional value. From the hypothesized variables of conditional value, productivity is the central or causal variable. Productivity influences promotability, at least perceived promotability, because it affects an individual's eligibility for promotion. Similarly, transferability is affected by productivity. In some cases transfers may also indicate promotion eligibility.

a. Determinants of Elements of Conditional Value

The elements of conditional value are the product of certain attributes of the individual and certain dimensions of the organization. The major individual's determinants of conditional value are the individual's

skills and activation level. The major organizational determinants of conditional value are the individual's role and the nature of organizational rewards.

(1) Instrumental Individual Determinants. The individual's skills represent his current developed potential to provide services to an organization.

Drawing upon Floyd Mann [Ref. 5], "...we are primarily concerned with a trilogy of technical, administrative, and human interaction skills, which are relatively stable and enduring. They can be, however, changed by training. In principle the set of skills a person possesses sets limits to the nature and magnitude of the services he can render to an organization. At an elementary level, such skills are the product of cognitive abilities and personality traits".

The individual's "activation level" is another determinant of his conditional value. Activity level can be defined as "the extent of release of the stored energy of the organism through metabollic activity in the tissues". In other wordss, it is the neuro-psychological counterpart of the notion of motivation. The level of activation is a major variable influencing human behavior. An individual's level of activation is not constant and may vary as a result of changes in physiological and psychological determinants.

The individual's skills and level of activation (motivation) interact to determine the person's potential for rendering services to an organization.

Individuals can compensate to a great extent for a lack of specific skills by increasing their activation level (motivation). An individual possessing a high degree of technical, administrative, and interpersonal skills, may provide less service to an organization than warranted by his potential because of a relatively poor activation level.

(2) Instrumental Organization Determinants. The individual's determinants of conditional value also interact with certain organizational determinants. Although an individual possesses a set of skills and the motivation to apply them, the organizational role he occupies influences the extent to which he is offered the opportunity to render his potential services. In this context a role refers to the set of behaviors expected from all persons occupying a specified position in an organization.

In an organization, as Katz and Kanh observed [Ref. 6], "...unlike the inclusion of a given organ of the body in the biological system, not all of the individual is included in its organizational membership. The organization neither requires nor wants the whole person".

For example, a person with a high degree of administrative skill may occupy the role of engineer, or the individual with a great skill in solving mathematical problems may occupy the role of a salesman. In either case, the individual's conditional value to the organization is determined, in part, by the interaction between his skills and his organizational role. In other words, the individual is included in his role on only a partial or segmental basis. The interaction between role and individual's skills is quite complex and the fact is that motivation is greatly influenced by it.

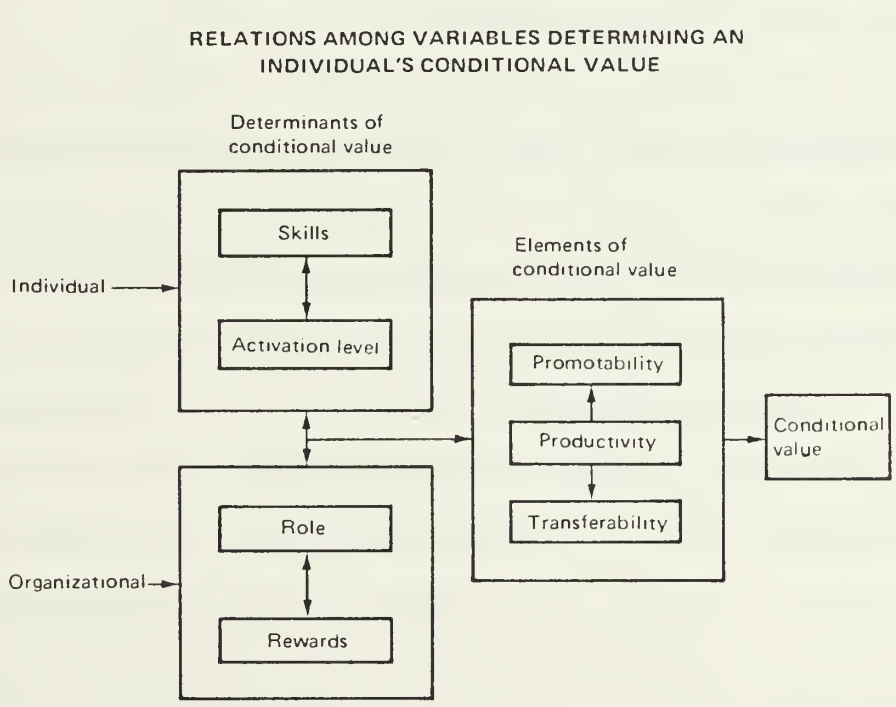
Another organizational determinant of an individual's conditional value are "rewards", which people expect to derive from different aspects of their membership in an organization.

Instrumental individual rewards which are administered in relation to individual effort, are intended to motivate optimal role performance, while instrumental system rewards which accrue by virtue of membership in the system are more effective for holding people within the organization, but they will not lead necessarily to higher productivity.

Instrumental individual rewards influence the individual's conditional value by affecting the degree of activation, and in so doing influences the extent to

which there is a fit between the person and the role. This is the so-called "path-goal hypothesis" presented by Georgopoulos, Mahoney, and Jones in Reference 7 that says that "...the more likely it is that the behaviors required by a given role will lead to rewards perceived to be instrumental in satisfying an individual's needs, the greater the inclusion of the person in the role, and, therefore, the greater the individual's conditional value to the organization".

Figure 4.2 tries to explain the relationship between all the variables determining an individual's conditional value.



SOURCE Eric Flamholtz, "Toward a Theory of Human Resource Value in Formal Organizations," *The Accounting Review*, October 1972, p. 673 Reprinted by permission of *The Accounting Review*.

Figure 4.2. Elements of Conditional Value

4. Probability of Maintaining Organizational Membership

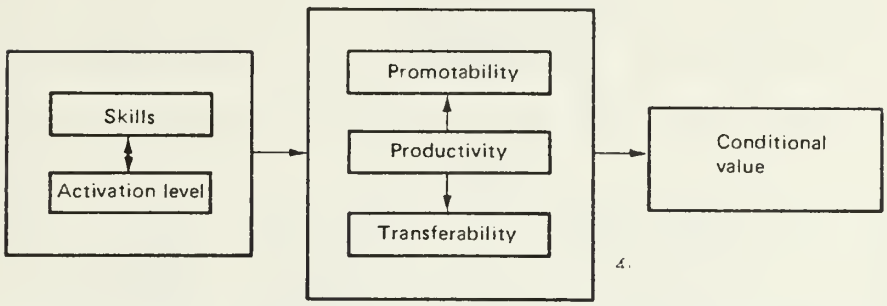
As we have seen the expected realizable value of an individual to the organization is the product of his conditional value to the firm and his probability of maintaining membership.

For assessing this probability we have to consider its determinants. Research on causes of turnover (exit) suggests that there is an inverse relationship between job satisfaction and the likelihood of exiting. Ross and Zander [Ref. 8] found that "...the degree of satisfaction of certain personal needs supplied by an individual's place of employment has a significant relationship to his continuing to work for that organization".

The conclusion is that workers whose personal needs are satisfied on the job, are more likely to remain in the organization. Also Fournet, Distefano, and Pryer [Ref. 9] concluded that "...the findings consistently show turnover negatively related to job satisfaction".

It is assumed that satisfaction is the product of the interaction between the individual and organizational determinants of an individual's value. This means that satisfaction seems to be caused by the same process that produces an individual's value, the interaction between the individual's skills, activation level and role, and the organizational reward structure (see Figure 4.3).

RELATION OF INDIVIDUAL DETERMINANTS
TO CONDITIONAL VALUE



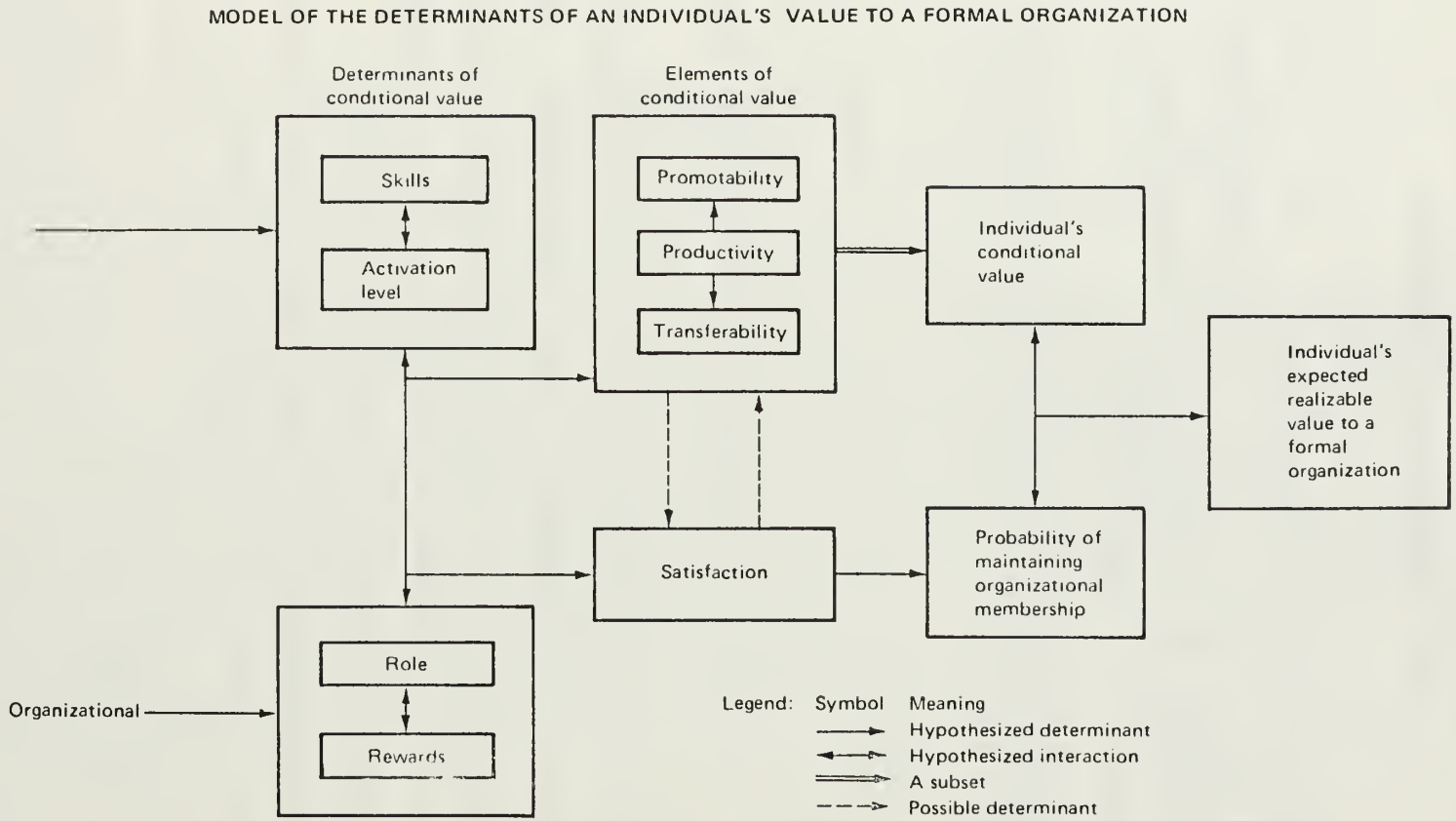
SOURCE: Eric Flamholtz, "Toward a Theory of Human Resource Value in Formal Organizations," *The Accounting Review*, October 1972, p. 671. Reprinted by permission of *The Accounting Review*.

Figure 4.3 Individual Determinants to Conditional Value

In addition to the relationship between satisfaction and the probability of remaining in the organization, it seems that there is also a relationship between satisfaction and productivity (one of the determinants of the conditional value). Productivity seems to be determined by satisfaction, but there is actually little research in this field for supporting an overwhelming evidence of this fact.

B. THE MODEL AND ITS IMPLICATIONS

The model of the nature and determinants of an individual's value developed above is shown schematically in Figure 4.4. As a whole it represents a framework for understanding



SOURCE: Eric Flamholtz, "Toward a Theory of Human Resource Value in Formal Organizations," *The Accounting Review*, October 1972, p. 668. Reprinted by permission of *The Accounting Review*.

Figure 4.4. Model of Determinants of an Individual Value

the factors comprising and influencing an individual's value to an organization.

The model shows that the ultimate measure for a person's worth to an organization is his expected realizable value, and not his conditional value that in fact is a penultimate measure.

This implication is very important because it is the contrary to the conventional notion of a person's value which does not distinguish between these two notions. For example, a personnel manager may prefer to hire an individual with the greatest potential value, rather than the one with the greatest anticipated value considering the likelihood of turnover. If the manager was trying to optimize the value of human resources, he would hire people with the greatest realizable value.

The model is also useful in obtaining a measure of the opportunity cost of turnover. If expected conditional value measures the maximum potential value of people to an organization, the difference between it and the expected realizable value represents the opportunity cost of turnover. Thus, this differential also represents the amount an organization can spend if it wants to reduce turnover to zero.

Conceptually the model permits us to understand the value of increasing, and the opportunity cost of decreasing

employee satisfaction. It shows that changes in satisfaction affect the probability of people maintaining membership in an organization, thus in turn influencing the extent to which an organization will actually derive a person's potential services.

This model also shows that satisfaction is an important determinant of a person's value and suggests the need for this variable to be measured and reported to management.

Another of the model's implications is that an individual's worth is not merely a function of attributes, but rather a product of a set of interacting economic, social, and psychological variables. A person's value is a function not only of its skills and activation level, but also of the organizational role he occupies.

The model's most important contribution for the monetary measurement of human resource value is its implications that a person's value is a product of both, (1) the attributes of the individual per se, and (2) the characteristics of the organization.

With regard to non-monetary measurements of human resource value, the model identifies several variables for measurement. It also shows the relationships of the variables to the ultimate and penultimate measures of a person's worth.

The model is intended to be a first step toward an integrated theory of human resource value in formal

organizations. Its scope is restricted to the nature and determinants of an individual's value to an organization, although it must not be inferred that the model fully explains the nature of an individual's value.

In a field study conducted to assess the validity of the proposed model the evidence obtained supported the validity of the model's hypothesized determinants. It was found, however, that the original model downgraded the effects of organizational attributes upon the value of people to organizations. A revised model is presented in Figure 4.5,

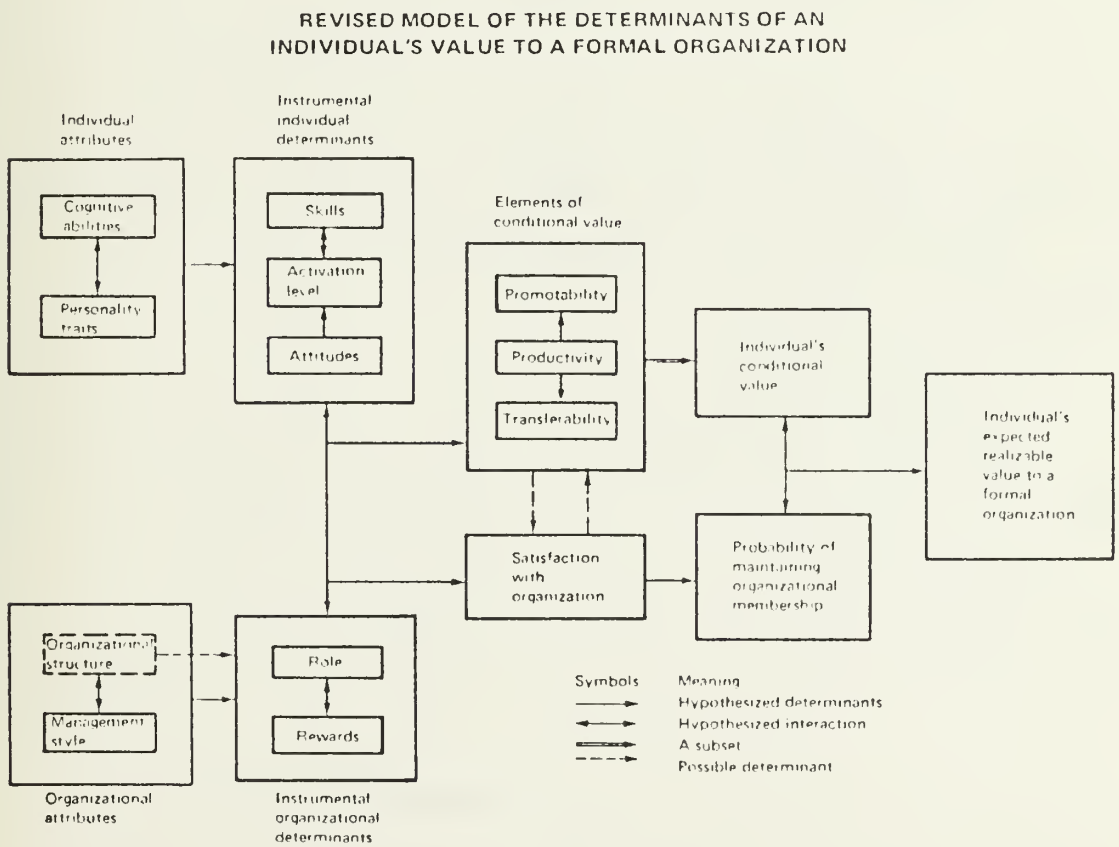


Figure 4.5 Revised Determinants of an Individual Value

where the more tentative determinants and their relationships are depicted by broken lines. In addition to the changes from the original model (weighing less than the infrequently observed variables) one other variable was included, organization structure.

V. MEASUREMENT THEORY AND ITS ROLE IN HUMAN RESOURCE ACCOUNTING

A. MEASUREMENT THEORY

Before the human resource evaluation, it is appropriate to review measurement theory and to realize its role in human resource accounting.

One of the ultimate objectives of human resource accounting is to develop measures of the economic importance of people to organizations. In so doing, it's essential to develop valid and reliable methods of measuring human resource costs and value.

The objective of this chapter is to outline the fundamentals of measurement theory and to lay the ground work for the study of the measurement aspects of human resource accounting. The nature of measurement is examined, measurement is defined, and the basic characteristics of different levels or scales of measurement are discussed. Next, the concepts of reliability and validity are presented and their role in the measurement process is illustrated. Finally, the notions of principal and surrogate measures are introduced.

B. THE NATURE OF MEASUREMENT

Measurement in a general sense means "the assignment of numerals to objects according to certain rules" as pointed

out in Reference 10. The type of rules used to do this assignment determines the class or level of measurement.

There are four basic levels of measurement: (1) nominal, (2) ordinal, (3) interval, and (4) ratio. We will examine each of these scales of measurement.

1. Nominal Scale

It represents the most basic level of measurement. The numerals assigned to objects according to the rules of nominal measurement do not have arithmetic significance, i.e., they do not have quantitative meaning. They just refer to the presence and absence of the object in a given class. The basic rules of nominal measurement are: assign a number to indicate the class to which an object belongs. All members of different classes of objects are assigned different numerals, while members of the same class are assigned identical numerals.

2. Ordinal Scale

It represents the next higher level of measurement. The numerals assigned to objects according to the rules of ordinal measurement do have arithmetical significance: their quantitative meaning is that of rank order. Thus, ordinal measures are ranks. The basic rule for ordinal measurement is: assign numerals to indicate the rank of the objects. If one object is higher than another object, assign a number to represent its higher rank. If an object

ranks lower than another, assign a lower numeral. Actually, the numerals assigned to indicate rank order can be either ascending or descending direction.

3. Interval Scale

It represents the next higher level of measurement. The numerals assigned to objects according to the rules of interval measurement have quantitative significance in the ordinary sense of the word, i.e., interval measures represent numerical differences between objects. Interval scales not only possess the same characteristics of nominal and ordinal scales, they also represent equal distances among the objects being measured. The interval scale, unlike the ordinal scale, permits us to express the differences in performance in terms of the distance or interval between them.

The basic rule for interval measurement is: assign numerals to indicate the differences between objects. If the distance between b and c is equal, then the difference between the numerals assigned must be equal.

4. Ratio Scale

It is the highest level of measurement that can be achieved. The numerals assigned to objects according to the rules of ratio measurement indicate the actual amount or magnitude of the property being measured, i.e., ratio measures represent absolute amounts and "true" differences

between objects. As Kerlinger [Ref. 11] states: "A ratio scale in addition to possessing the characteristics of nominal, ordinal, and interval scales, has an absolute or natural zero that has empirical meaning". In contrast, an interval scale has no meaningful zero point, and therefore cannot express the ratio between objects.

The basic rule for ratio scale measurements is: assign numerals to indicate the absolute difference between objects. If one object possesses twice as much of a property, give it a number twice as large. If it possesses none of the property, assign a zero.

5. Levels of Measurement in Human Resource Accounting

Like all measurements, human resource accounting measurements may achieve any of the four levels or scales of measurement: equality of class, rank order, equality of interval, and equality of ratios. The level of measurement required depends upon the use for which a measure is intended. If, for example, we are interested in forecasting manpower requirements, then we want to know how many people will be needed in each position at specified future times. This is equivalent to nominal measurements, i.e., how many people will be required in each "class" or position classification. Similarly, if a department store is facing a mandatory lay-off of 10% of its sales force, the department manager would want a rank order of people

according to their present and future value. Other factors being equal, he would keep the people with the greatest value to the company. However, if a personnel manager were faced with a decision involving the allocation of his training budget, he would require a measure of the expected return to be derived on alternative investment proposals. This is equivalent to ratio scale measurements.

A given decision may require a minimum specified scale of measurement. Thus, it is necessary to know the level of measurement actually achieved by human resource accounting's measures.

C. RELIABILITY AND VALIDITY MEASURES

The nature of a measurement depends upon its "quality". There are two primary dimensions of a measurement's quality: reliability and validity.

1. Nature of Reliability

Reliability, in the sense we are going to use it, refers to the degree to which repeated measures of a given construct yield the same result.

It is necessary to know a measurement's reliability because virtually all measuring instruments are subject to some errors. Reliability is, therefore, the degree to which the measuring instruments are free from measurement error.

The key idea to remember about reliability is that a measurement must be reliable to be useful. Unless a

measurement procedure consistently produces the same or approximately the same result, it is not possible to rely upon it. Thus the degree of reliability is an important attribute of measurements.

2. Nature of Validity

Another important attribute of measurement is validity, which we will use in the sense of the degree to which a measurement of a given construct actually measures what is purposes to measure. As Kerlinger has observed [Ref. 12], the commonest definition of validity is epitomized by the question: "Are we measuring what we think we are measuring?"

The criterion of validity is necessary because a measurement instrument is useless unless it measures what it purposes to measure. A measure may be intended to represent a given property, but it may or may not succeed in representing that property.

Criterion validation is one method of checking the validity of a measure. According to Philips [Ref. 13], "...this method involves the use of a well accepted measure of a given concept to aid in the assessment of a new measure of the same concept. The validation procedure involves determining the relationship or correspondence between the new measure and the criterion, or well accepted measure. If a close relationship is found, this is interpreted as

evidence to support the validity of the new measure". This process uses basically statistical techniques.

3. Reliability and Validity of Human Resource Accounting Measures

The reliability and validity of human resource accounting measures must be assessed just like any other measure. We need to know the degree to which a given measure is reliable as well as the extent to which it is valid.

It should not be inferred that reliability and validity of human resource accounting measures is a well defined and absolute characteristic. Reliability and validity are variables, and the degree of reliability and validity required by human resource accounting measurements depends on the use for which they are intended.

D. PRINCIPAL AND SURROGATE MEASUREMENTS

In dealing with real world phenomena we are continually faced with problems of measurement. One of the most common and significant problems is the difficulty of actually measuring the property we wish to measure. Because of difficulties encountered in measurements, it is sometimes necessary to use a proxy or surrogate in lieu of a principal measure. Thus, measurement may involve two different kinds of measures: principal and surrogates.

The ultimate concept we want to measure is called the principal. In defining a principal, Ijiri, Jaedicks and

Knight stated that "...by a principal input or a principal, we mean a decision input upon which the decision maker wants to base his decision ultimately" [Ref. 14].

When it is not feasible to obtain measures of the principal, it is necessary to develop or use a surrogate or proxy measure of the principal. The function of the surrogate is to serve as a substitute for the principal. As the same authors stated, "A surrogate input or surrogate is a decision input upon which the decision maker bases his decision only in so far as the surrogate reflects the principal". Thus, a principal measure is an ultimate measure of some phenomenon, while a surrogate is a substitute to be used in place of it.

1. Characteristics of Principals

There are some common reasons why principals may be difficult to obtain. First, it would be impossible to obtain a principal that is a hypothetical concept such as "ego". Second, it may not be feasible to obtain a measure of the principal because of time, cost, or operational constraints. This can result, for example, if an accounting system is not set up to report personnel costs. The cost of tracing such costs in the files can be prohibitive. The difficulty in obtaining principal measures is a familiar accounting problem. The balance sheets should show what the organization is worth, that is, its value. However, the

methods and principles of accounting produce balance sheets that show only historical costs, because it is not feasible to objectively measure value, but it is possible to measure cost with a greater degree of objectivity.

W. A. Paton as aptly stated the rationale for using cost as a surrogate of value: "Cost is significant primarily because it approximates fair value at date of acquisition. Cost is not of basic importance because it represents an amount paid. It is important as a measure of what is acquired " [Ref. 15]. Thus, accounting has chosen to use cost as a surrogate for value because of the difficulties in obtaining the principal.

2. Quality of Surrogates

The quality of surrogate measure is determined by the extent to which it satisfies three criteria: (1) functional equivalence, (2) validity, and (3) reliability.

First, surrogates are functional measures, i.e., they are decision inputs. The surrogate is just an intervening measure which conditions the actions that will be taken upon the basis of the principal.

The second criterion for surrogates is validity, that is, they must represent what they are intended to represent. Validation is essentially a test of the degree to which a measure is a functional equivalent of a principal.

The third criterion is reliability. Surrogates must reliably measure whatever it is that they measure.

3. Selection and Use of Surrogates

For a given principal measure, there may be several possible surrogates. The choice among alternative surrogates depends on: (1) the use to which the surrogate is put, and (2) the relative validity and reliability of the surrogates.

Another aspect of the use of surrogates is that a set of surrogates may be required to represent a single principal.

For the validation of surrogate valuation models, refer to Chapter VII, Section D.

VI. NON-MONETARY MEASUREMENTS OF HUMAN RESOURCE VALUE

There are many variables in human resource accounting that are difficult to measure. Nevertheless we have to find some methods to attribute numbers to these variables. In the easy case, when variables are measurable it is easy to assign a number (the magnitude) of the variable or the corresponding monetary value.

But sometimes it is virtually impossible to have a direct measure and so the need for non-monetary measurements. We will try to examine in this chapter how non-monetary measurements can be used and we will try to apply these methods for the model developed by Flamholtz for individual human resource value, introduced in Chapter IV.

A. IMPORTANCE OF NON-MONETARY MEASUREMENTS

Although accounting has historically used money as its basic unit of measurement, "...there is no reason why money should be the only unit of measurement used in accounting" as recently suggested by the American Association's Committee to Prepare a Statement of Basic Accounting Theory [Ref. 16].

In human resource accounting, non-monetary measures of human resource value have significant uses. First, they may be used for decisions that do not require monetary

measurements. Lay-off decisions, for example, do not require monetary measures of human resource value. Second, non-monetary measures may be used as surrogates for monetary measurements. For example, a ranking of people according to their conditional value may be used as a surrogate for the monetary measurement of conditional value. Third, non-monetary measures may be used to predict monetary measures as we will see in a coming section. Thus, it is important to develop valid and reliable non-monetary methods of measuring human resource value.

B. TECHNIQUES OF MEASUREMENT

Several techniques may be used as non-monetary measures of human resource value.

They include measurements commonly used in personnel research and personnel management, as for example, skill inventories, performance evaluation methods, potential assessments and attitude measurements. The concept of subjective expected utility may also be useful. These concepts are described below.

1. Skills inventories

Skills inventories (or capability inventory) is a basic technique, an inventory or enumeration of the capabilities of organizational members. It may identify education, knowledge, and experience in addition to skills. The capability inventory represents a nominal level of

measurement. It is a classification of people according to their skills and represents a type of balance sheet of the potential kinds of services which can be rendered by people as of a specified time. An example is shown in Figure 6.1.

2. Performance Evaluation Methods

Performance evaluation methods can be facilitated by several techniques from which ratings and rankings are relevant in human resource accounting.

1971 ABT ASSOCIATES INC. STAFF CAPABILITIES

	Education			Years Experience				
Education and Experience Area	*BS/BA*	*MS/MA*	*Ph D*	*0-2*	*3-5*	*6-10*	*11-15*	*16-25*
Social Sciences								
Economics	21	5	3		9	1	1	
Education	7	8	2	11	17	8	2	3
Law			6 (J.D.)		3	1		
Political science	26	8	3	2	1	4	2	
Psychology	4	3	3	2	1	1	1	
Sociology	13	8	2	6	15	5	1	2
Urban studies	2	1			3	1		
Subtotal	73	33	19	21	49	21	5	5
Management Sciences								
Business administration		22		2	5	4	4	
Marketing	1			2	5	2	1	1
Planning				1	5	3	1	
Public relations				2	3	4		
Subtotal	1	22	–	7	18	13	6	1
Physical Sciences								
Computer science	4	3	1	2	5	1	1	1
Engineering	7	4	1		6	5	1	1
Mathematics	3							
Physics	9	2	2		2	1		
Subtotal	23	9	4	2	13	7	2	2
Humanities								
Classics	1							
English	5	1		1	1			
French	2							
Spanish	1							
Fine arts	1				1	2		
History	16	3			2			
Journalism	1	3						
Philosophy	4							
Liberal arts	5	1	0					
Subtotal	35	9	0	1	4	2	–	–
Totals	132	73	23	31	84	43	15	8

24 staff members have training in at least two different disciplines giving individuals interdisciplinary capabilities

SOURCE *Abt Associates, Inc. 1971 Annual Report*, p. 9.

Figure 6.1. Example of a Skills Inventory

For example a supervisor may rate a person on the extent to which he possesses intelligence, technical knowledge, motivation, interpersonal skills, and judgement. Rating typically consists of a numerical score on these or other characteristics.

An example of a ranking could be a supervisor ranking his subordinates on their leadership potential.

3. Ratings

Ratings are methods of assessing a person's performance in relation to a set of scales. Typically, the rating consists of a numerical score on these or other scales.

4. Rankings

Rankings are ordinal forms of rating. By this method an evaluator ranks people on one or more dimensions. Several procedures can be used to obtain rankings.

a. Simple Ranking

The simple ranking method is where people are ranked on the dimension being studied by selecting the highest, then the next highest, and so on.

b. Alternative Ranking

The alternative ranking method is designed to simplify the judgement involved in ranking and in turn increase its reliablity when after choosing the highest we choose the lowest, and after that the next highest and so on.

c. Paired Comparisons

The paired comparisons method derives a ranking from a series of comparisons of one person with each other person (it is cumbersome if the number of people involved is greater than 10).

The second method is most used because it is as reliable as the third one and less cumbersome.

5. Assessment of Potential

Assessments of potential are designed to determine a person's capacity for development and promotion. The aim is to measure the services that people are potentially able to render to an organization.

The major approach to assessment of potential is a trait approach, where we attempt to identify the traits required for success in a given position and assess the extent to which people possess these traits. The assessment can be done either by judgemental or psychometric methods.

6. Attitude Measurements

Attitude measurements are techniques designed primarily to obtain information about the tendency for people to express feelings about "some object". By means of attitude surveys, organizations may assess the attitudes of people towards their jobs, pay, working conditions, or the organization as a whole. Thus the sources of employee satisfaction and dissatisfaction may be identified.

7. Subjective Expected Utility

Subjective expected utility is a concept which combines two more fundamental notions: (1) utility and (2) subjective probability. Utility is the economic concept of subjective value. It is a resource's perceived value to its user. Subjective probability is the subjective estimation of an event likelihood. It is a person's degree of belief in the likelihood of an event.

Psychophysical methods have been developed to measure utility and subjective probability directly. The methods involve procedures for scaling subjective magnitudes. They include paired comparisons, rating methods and magnitude estimation. The first two techniques were already introduced. The third, magnitude estimation is a scaling procedure that purposes to achieve a ratio level of measurement. It involves assigning numerals to indicate the magnitude of a property or characteristic. Zero means that there is none of the property, while high numerals indicate a great deal of the property. If one object has twice as much of a property as another, its assigned numeral would be twice as high.

C. MEASUREMENT OF INDIVIDUAL'S VALUE DETERMINANTS

In the Flamholtz model for individual value there were several variables (see Figure 4.4). We will try to apply the above concepts to the measurement of these variables.

1. Expected Realizable Value

Expected realiable value can be measured by applying certain personnel evaluation methods. One of them is ranking. One evaluator ranks people according to their expected realizable value to an organization. Any reporting senior can be the evaluator since he knows the people he is going to rank. In fact, the ranking procedure results in an ordinal measure of people according to their subjective expected realizable utility. This is a measure of gross value of people to an organization. A true measure of their economic value would reflect their net contribution, i.e., their gross value less their compensation, and other costs associated with their utilization.

2. Expected Conditional Value

Expected conditional value is the penultimate component of a person's value to an organization. It can also be obtained by ranking. In this case the evaluation must assume that no one is going to leave the organization. Usually the person with the highest value is ranked first and the person with the lowest value at the bottom.

3. Probability of Maintaining Membership

Probability of maintaining membership can be derived either by actuarial probabilities or subjective probabilities. Actuarial probabilities can be obtained from the organization past history (through a transition rate

matrix) and subjective probabilities can be derived from managerial judgement. Magnitude estimation can be used to estimate these probabilities.

4. Elements of Conditional Value

There are three hypothesized elements of a person's conditional value: productivity, transferability, and promotability.

Research is actually trying to develop better methods for measuring these variables under the labels of "performance" and "potential".

a. Performance

Performance refers to the contribution that a person has already made in his current organizational role. It may be measured by either objective or subjective indicators (units produced, efficiency, quality, scrap, ability to meet schedules, etc., and rating or ranking methods).

b. Potential

Potential refers to the contribution that a person is expected to make to an organization in the future. It is the potential to occupy positions of greater responsibility and transferability. It can be measured by subjective assessment and psychometric tests.

Subjective assessments of potential are quite common in organizations (including the Navy) with ratings of

various personality characteristics such as intelligence, initiative, judgement, and leadership ability. Also they may ask to assess a person's overall promotability and the position which he may soom be ready to occupy. Psychometric tests are also commonly used to assess one person's potential. Tests of intelligence, personality, and aptitude may be used as an input in promotion decision. The tests may be scored in order to indicate a person's promotability in relation to others.

c. Satisfaction

Satisfaction can be measured by means of attitude surveys. Questionnaires can be constructed aimed at having a global measure of employee's satisfaction with their job, pay, supervisor, working conditions, peers, chances for promotion, etc.

5. Instrumental Individual's Determinants

The instrumental individual's determinants consist of two variables: skills and activation level (motivation).

A person's skills can be measured by a capability inventory. Motivation can be measured by means of an attitude survey. All the questions in the survey must be assessed in their validity and reliability with which they indicate the concept being measured. The concept is measured by scaling responses.

6. Instrumental Organizational Determinants

As hypothesized they were a person's role and organizational reward. Methods of job analysis can be used to measure the content of a job. We know that such job-related factors as stimulus variation, stimulus intensity and meaningfulness are determinants of a person's motivation. However, methods need to be developed to standardize measurements of these factors.

7. Rewards

Rewards can be measured by attitude surveys. People can be asked to indicate their perceptions of the magnitude desirability, and equitability of the organization's reward system.

D. SUMMARY

As a conclusion regarding the above non-monetary measurements of human resource value, we can say that further research is needed because the current state of human resource accounting has not yet fully been developed in this area. For the cases where monetary measurements are not available, non-monetary measurements, although imprecise, are the best available approach.

VII. MONETARY MEASUREMENTS OF HUMAN RESOURCE VALUE

A. VALUATION OF INDIVIDUALS

Monetary measurements of human resource value are needed in order to translate manpower resources into the common denominator on which organizational decisions are made, i.e., money.

Monetary methods can be applied to the individual, groups, and the total human organization.

As we have already seen there are two major dimensions of a person's value to an organization: expected conditional value and expected realizable value. They are the penultimate and ultimate components of the Flamholtz individual value as described in Chapter IV (Figure 4.4).

There are two related approaches to measuring these aspects of a person's value: direct and indirect. The former approach attempts to measure an individual's expected conditional and realizable value per se. This is an attempt to derive a direct or prinicipal measure of a person's value. (A principal measure is in fact the measure we are trying to obtain. A surrogate is a substitute for a principal.)

The other approach involves applying various possible surrogates or proxy measures of economic value, to people in

order to obtain indirect measures of expected conditional and realizable value. We will see two models of the former approach, the stochastic reward evaluation model and the normative economic valuation model. Of the second approach several tentative models will be presented.

B. DIRECT MEASUREMENT OF EXPECTED CONDITIONAL AND REALIZABLE VALUE

1. Stochastic Rewards Valuation Model

This method was proposed for measuring a person's expected conditional and realizable value directly. It is based on the notion than an individual generates value for an organization as he occupies and moves among organizational roles and renders services to the organization.

The process of movement (transition) of people among organizational roles is a stochastic process; that is, the movement of people from one role to another over some specified time period is a probabilistic process depending upon prior states of the system. Thus the role one person occupies in the future is uncertain and depends on roles previously occupied.

A model of the stochastic process shows the likelihood that a person will move from one state (role) of the system (organization) to any other state during a specified time period (states are defined to be mutually exclusive, and an individual can therefore occupy only one state at a specified time).

The "states" of a stochastic model may be defined to include not only organizational roles but also the state of "exit", a state occupied when a person leaves the organization.

Stochastic processes with rewards are stochastic processes where the transition is accrued by "rewards", or the benefits derived by the system. As people occupy organizational roles they render services (rewards) to an organization. The roles they will occupy depend probabilistically upon the roles previously occupied.

a. Elements of the Model

Based on the above conceptualization, we can measure an individual's expected conditional and realizable value to an organization by means of a stochastic rewards valuation model. To do this, we, as stated in Reference 17, must: (1) define the mutually exclusive set of "states" an individual may occupy in the system (organization), (2) determine the value of each state to the organization (reward), (3) estimate a person's expected tenure in the organization, and (4) find the probability that a person will occupy each possible state at specified future times.

The states will be defined to include the various organizational roles and the state of exit (see Figure 7.1, for an example). Since we are in a stochastic process with rewards, we will call these states "service

SERVICE STATE MATRIX

Organization Levels	*Organization Groups*		
	Marketing	Manufacturing	Finance
Top management			
Middle management			
First-line supervisors			
Operating personnel			
	Exit		

Figure 7.1. Service State Matrix

states". Underlying this classification is the idea that we expect to derive a specified quantity of services when an individual occupies a particular service state for a given time period.

The final step is to estimate the probability that each person will occupy each possible state at specified future times. Symbolically speaking, the model requires that we define the set of i possible states, where i = 1, 2, ..., m where m = state of exit. Secondly, we must determine the value to the organization of each of the i service states where Ri denotes the set of i possible service state values, R1, R2, ..., Rm. Since Rm denotes the state of exit, it is zero by definition. Third, we must estimate a person's expected life (tenure) in the organization, where t denotes expected tenure. Finally, we must find the probabilities that a person will occupy each of the

i possible positions at a specified time. This is in fact the probability that the organization will drive the rewards associated with different service states. It is noted P(Ri) which includes P(R1) + P(R2) + ... + P(Rm).

b. Measurement of Expected Conditional Value

Drawing upon this model we can symbolically define a person's expected conditional value as:

$$E(C.V.) = \sum_{t=1}^{m} \left[\frac{\sum_{i=1}^{m-1} Ri.P(Ri)}{(1+r)^t} \right] \qquad (1)$$

where E(C.V.) = expected conditional value; Ri = value R to be derived by the organization (reward) in each possible service state, i.e., P(Ri) = the probability that the organization will derive Ri (the probability that a person will occupy state i); t = time; m = state of exit; r = interest rate; and (1+r) the discount rate for money. In other words, this expression simply means that an individual's expected conditional value is the discounted mathematical expectation of the monetary worth of the future rewards (service) the person is expected to render to an organization in the future roles (positions) expected to be occupied, when we ignore (hold constant) the probability of turnover.

Expression (1) tells us how to measure conditional value. It literally says: For each time period (t = 1, 2, ..., n) calculate the discounted mathematical expression (expected value) of the rewards a person will generate to the organization, { Ri.P(Ri)/(1+r) }, assuming that the person will not leave the organization. Recall that by definition, the expected conditional value is the present worth of the potential services that are expected to be rendered to the organization if the individual maintains organizational membership throughout his expected service life.

c. Measurement of Expected Realizable Value

Drawing on the model, we can symbolically define a person's expected realizable value as:

$$E(R.V.) = \sum_{t=1}^{m} \left[\frac{\sum_{i=1}^{m-1} Ri.P(Ri)}{(1+r)^t} \right] \qquad (2)$$

where all symbols have the same meaning as in expression (1). The only difference is that the service states include the state of exit (m). Recall that by definition the expected realizable value is the present worth of the services an organization actually expects to derive from an individual during the person's anticipated tenure in the

organization. Conceptually it is the product of conditional value and the probability that the person will maintain organizational membership.

d. Relationship Between Expected Conditional and Realizable Value

Both values can be equal if and only if the person is certain to remain in the organization throughout his expected service life. If the probability of turnover exceeds zero, expected conditional value must exceed realizable value (see example in Figure 4.2).

e. Applications of the Stochastic Rewards Valuation Model

To apply this model in an actual organization it is necessary to: (1) define a set of service states, (2) derive a measure of the value of each state, (3) estimate an individual's expected service life, and (4) the probabilities that the individual will occupy each service state at each point during his expected service life.

The basic problem in applying the model is the difficulty in obtaining valid and reliable data inputs of: (1) the value of a service state, (2) a person's expected tenure, and (3) the probabilities of occupying states at specified times. The problems that we are facing are the following.

(1) Measurement of Service State Values.

Ideally, the appropriate measure of the value derived when an individual occupies a specific service state for a time

period is the discounted future earnings contributed to the organization (what accountants call "economic value"). In principle this can be measured by either (1) the price quantity or (2) the income method.

The price quantity method involves determining the product of price per unit of human services and the expected quantity. The income method involves forecasting the expected earnings of an organization and allocating them between human and other resources, and further allocation among specified people.

In human capital intensive organizations (service organizations such as aerospace, C.P.A., and advertising firms), the problem of measuring service state values are relatively small. However, there are many organizations in which it is very difficult, if not impossible, to obtain a measure of service states' value by any of these methods. In these cases, we must use surrogate or proxy measures (variables).

(2) Measurements of Expected Service Life. The model uses a valuation period equal to a person's expected service life. Service life is a random variable influenced by many factors, including the individual's natural life expectancy, his health and his organizational mobility.

So, we have to take the probabilistic approach of expected service life. There are two ways of

measuring a person's expected service life: (1) by using a historical experience to develop actual predictions, and (2) by subjective forecasts of future probabilities. Both methods were covered in Chapter V.

(3) Measurement of Mobility Probabilities. There are also two ways to measure the probabilities that a person will occupy specified service states at future times. These are the same methods used to measure a person's expected service life: actuarial and subjective predictions.

Both methods have pro's and con's. Historical methods can be invalid if the actual underlying conditions are very different. Historical predictions are more objective (verifiable) than subjective probabilities. Subjective probabilities are by definition more subject to bias by the person who supplies them. But he can take changes into account in a better way than past probabilities do.

Operational systems have been tried for some organizations but they have not been fully tested until now.

2. The Normative Economic Valuation Model

This model, also intended for measuring directly a person's expected conditional and realizable value will be presented in Chapter IX.

C. INDIRECT MEASUREMENT OF HUMAN RESOURCE VALUE

1. Need for Surrogate Models for Individual Valuation

Because of the difficulty of measuring a service state's value it may not be feasible to apply the stochastic rewards valuation model described above. This suggests the need for surrogate methods of measuring a person's expected conditional and realizable values.

There are several possible surrogate monetary measures of an individual's value to a formal organization: (1) original costs, (2) replacement costs, (3) current costs, (4) compensation, and (5) opportunity costs. We will assess the feasibility of using each of these measures to develop a surrogate model for individual valuation.

a. Original Costs (Historical Costs)

The advantages of using this method are that (1) it would be consistent with the conventional accounting use of cost as a surrogate of value, and (2) it seems feasible to measure the costs actually incurred in acquiring people. The primary disadvantage is that except at the date of acquisition, the cost incurred to acquire a resource may bear no significant relation to its value today.

b. Replacement and Current Costs

Both have greater relevance than historical costs in human resources investment decision and in the evaluation of human resource utilization, because they are

by definition more closely related to the market's current assessment of an asset's economic value.

In principle, both current costs and replacement costs reflect an individual's value to a formal organization. Drawing upon Chambers, "...current costs or market value is, by definition, the market assessment of an individual's value as a resource. Replacement or reproduction cost is similar to current cost, except that it represents the sacrifice to be incurred by a single firm, rather than the market as a whole, in replacing its resources" [Ref. 18].

When choosing between replacement cost and current cost as surrogate, the feasibility of obtaining observations of the surrogate in the real world is the critical factor. Measures of an individual's market value are generally not available (exceptions are professional athletes in football, baseball, basketball, etc.). Similarly, measures of a person's replacement cost are not available, although it is normally feasible to develop them. Thus, it seems likely that replacement measures of an individual may ultimately be used as one possible surrogate measure of an individual's value. Some skills such as doctors, welders, or electronic technicians are available in the open market.

A primary limitation of replacement cost, like historical cost, is that it may not bear a significant value

to a resource's value. Research done on this subject shows that although replacement cost is almost an ideal method of asset valuation, it suffers from two limitations: (1) management may have some particular asset which it is unwilling to replace at current cost, but which it wants to keep using because the asset has a value greater than its scrap value (there must be some method of valuing such an asset), and (2) there may be no similar replacement for a certain existing asset.

c. Compensation

Compensation measures such as salary or commissions are possible surrogates. Compensation is the price paid for the use of units of human services. On the surface, these measures purpose to represent an organization's assessment of the value of an individual's services, so they are potentially useful for developing a surrogate valuation model.

However, compensation measures may or may not be satisfactory surrogates of an individual's value, depending on a variety of factors from compensation policy, wage and salaries structure, the presence or absence of unions. They must be as any other measures empirically assessed for their validity. In spite of these possible limitations, a person's capitalized future salary has been proposed as a surrogate measure of his value to the firm. This approach

involves forecasting a person's future salary and discounting these expected earnings to their present worth. The "adjusted present value method" of Roger Hermanson and the Lev and Schwartz compensation method are presented below, as examples of valuation methods using compensation surrogates.

(1) Adjusted Present Value Method.

Another method for the evaluation of human resource value was proposed by Roger Hermanson. The method proposed what he called the "adjusted present value method" and, in fact, should be called the "adjusted discounted future wages method," because he proposed to use the present value of the stream of the future wage payment payments to people, adjusted by a performance efficiency factor, as a proxy measure of their value to the organization.

Conceptually, the efficiency factor is a ratio based upon the return on investment derived by the specified firm relative to all other firms in the economy for a specified period. Hermanson supports the use of his ratio by arguing that the differential earnings of a firm are attributable to human resources. He states that "...since the owned assets lying idle would earn nothing, the differences in rate of earnings can ultimately be traced to the effort of operational assets" [Ref. 19: p. 9]. Also, "...it can be argued that operational assets are primarily

made up of various human resources...". Thus, he suggests that one way to measure the value of human resources is on the basis of their expected compensation adjusted for their efficiency relative to the efficiency of other human resources operating in the economy.

The key point of this method is the calculation of the efficiency ratio. Hermanson proposes to use a weighted average of the firm's net income during the past five years. The efficiency ratio is calculated by the following expression:

$$\text{Efficiency Ratio} = \frac{5\frac{RF0}{RE0} + 4\frac{RF1}{RE1} + 3\frac{RF2}{RE2} + 2\frac{RF3}{RE3} + 1\frac{RF4}{RE4}}{15}$$

where the RF's refer to the rate of income on owned assets for the firm, and the RE's refer to the average rate of income on owned assets for all firms in the economy (rate of income is the ratio between income earned and assets owned in a given time period). A coefficient of 1 affects the fourth year previous, and so on. The current year will be affected by a coefficient of 5. The different weights used purpose to give more emphasis to recent performance than past performance. This efficiency ratio is then used to adjust the present value of expected future wages payments

over a five year period in order to derive a surrogate measure of human resource value.

There are three steps to calculate "adjusted discounted future wages": (1) calculate unadjusted discounted future wages for a give year period, (2) calculate the efficiency factor, and (3) adjust the discounted wages by the efficiency factor.

The method has certain limitations: (1) the valuation period is arbitrary, (2) the efficiency factor will be difficult, if not impossible, to apply in the real world because data may be simply not available, and (3) the weighting scheme used in computing the efficiency factor is arbitrary.

It seems that it will merely permit a ranking of the value of human resources of various firms. This method seems no good for managerial purposes, but useful for external reporting to investors.

In brief, the idea of using compensation as a surrogate for human resource value is sound. However, the method has some limitations.

(2) Lev and Schwartz Compensation Model. Baruch Lev and Aba Schwartz also proposed the use of compensation as a surrogate measure of a person's value [Ref. 20: pp. 148-152]. Recognizing that the general valuation model presupposes a perfect knowledge of future income streams

associated with a resource, they choose to measure a person's value to an organization in terms of his expected earnings. Thus, the value of a person is the present value of his remaining future earnings from employment.

Their valuation model for a discrete income stream is:

$$V_{\tau} = \sum_{t=\tau}^{T} \frac{I(t)}{(1+r)^{t-\tau}} \qquad (1)$$

where V = the human capital value of a person τ years old. I(t) = the person's annual earnings up to retirement. r = discount rate specific to the person. T = retirement age.

Strictly speaking, expression (1) is an ex-post computation of human capital value, since only after retirement is the series I(t) known. The authors converted their ex-post valuation expression to an ex-ante model by replacing the observed (historical) values of I(t) in (1) with estimates denoted I*(t) of future annual earnings. They also suggest a means of obtaining the estimated future earnings data.

According to their findings, the estimated human capital value of a person τ years old, is thus:

$$V_{\tau} = \sum_{t=\tau}^{T} \frac{I^*(t)}{(1+r)} \qquad (2)$$

As this expression ignores the possibility of death before retirement, they incorporated this factor in a new expression:

$$E(V) = P(t+1) \quad \frac{I^*(t)}{(1+r)^{t-\tau}} \qquad (3)$$

where E(V) is the expected value of a person's human capital and P(t) is the probability of a person dying at age t.

The major limitation of this model is that it ignores the possibility that the individual will exit from the organization for reasons other than death or retirement. Thus, the application of the model can significantly overstate or inflate the value of human capital.

In fact, the so called measure of "expected value of the person's human capital," is in fact a measure of the expected conditional value of a person's human capital because it is implicitly based on the assumption that the person will remain in the organization until death or retirement. We cannot ignore the possibility of turnover and so it is necessary to consider not only a person's expected conditional value, but also the individual's expected realizable value, the present worth of services actually expected to be derived during the individual's anticipated tenure in the organization.

Another major limitation of this valuation model is that it ignores the probability that people will make role changes during their careers. This expectation in business is somewhat unrealistic and it can significantly distort the value of a person's human capital.

d. Opportunity Costs

Opportunity costs is another possible surrogate measure of a person's value. Opportunity cost is the value of an asset in an alternative use. It is measured by the amount of net cash inflows that must be sacrificed in order to direct a resource from one use to another. Thus, it is the value of one opportunity foregone. In the case of an individual, the opportunity cost is the value foregone by allocating the person to one job rather than to another.

(1) The Hekimian and Jones Method. Hekimian and Jones presented a method of measuring indirectly the expected conditional and realizable value of individuals, applying the concept of opportunity costs [Ref. 21: p. 108]. It purposes to establish the value of people by establishing an internal labor market in a firm through the process of competitive bidding. Under this method all the managers of investment centers would be encouraged to bid for any scarce employee they want. The manager who is successful in acquiring a service of a bid-for employee includes his bid price in his investment base. The benefit to the winning

bidder is the increased profit he can earn with the services of that scarce employee.

One of the key questions involved in this method is "what procedures should be used by the manager to determine the amount to bid for a specified person?" Theoretically, the manager should base his bid upon the present value of the differential earnings expected to be contributed by the addition of a human resource. Unfortunately he has no simple means of doing that. Indeed, this is precisely why we are trying to develop surrogate measures for a person's value! This is the reason why the opportunity costs concept as surrogate for a person's value, although theoretically sound, is not applied in practice.

D. VALIDATION OF SURROGATE VALUATION MODELS

It is not enough to assert that there is an identity or even close correspondence between the true unknown economic value of individual's and surrogates such as replacement cost, compensation or other proxy measures, and having made these assumptions, to simply utilize the purposed surrogate in place of measures of value. Instead, these assertions should be reviewed as testable hypotheses. In these terms the research question posed is: What is the relation between Si and an individual's value to a specified organization? Where Si refers to the set of i possible surrogate measures of individual's value.

Recent studies tried to assess the convergent and discriminant validity of selected surrogates (compensation, replacement cost and performance measures) as surrogates for an individual's value to an organization.

1. Criterion-Validation

The process is basically in the statistical field, based on data available or constructed in a field of study.

The studies just mentioned tried to investigate the empirical relationship between (1) the value of the person as represented by each of the surrogates, and (2) the value assigned by organizational representatives using traditional personnel rating methods.

This method is known as "criterion-validation", and according to Philips "...involves the use of a well accepted measure of a given concept to aid in the assessment of a new measure of the same concept" [Ref. 22: p. 160].

The validation procedure involves determining the relationship or correspondence between the new measure and the criterion or well accepted measure. If there is a close relationship, this is evidence to support the hypothesis that the new measure is a valid representation of the given concept. This result is known as "convergent validity."

Criterion-validation has two potential limitations as a research method: (1) a well accepted measure of a given concept may not exist, and (2) even if one does exist,

it may be less valid than the measure it is used to validate, or the validity of the criterion may not be well established.

2. Measurement and Data Collection

In one of these field studies conducted by Eric Flamholtz [Ref. 23], the problem was that there were no validated criterion of a person's value. The "criterion" used in this study was a managerial ranking of people according to their perceived value to the organization.

Since it is up to management to do the ranking this method is commonly used to validate personnel selection methods because it has face validity. That is, it makes sense to management. It doesn't purpose to be a normative or theoretically correct criterion. It is just a descriptive or predictive criterion, in what concerns what management's behavior is likely to be with respect to people.

Three dimensions of replacement costs were tested: positional, conditional, and realizable. One simple compensation (annual salary) was tested as surrogate (there was no attempt either to capitalize compensation as suggested by Hermanson and Lev and Schwartz or to use it as a measure of a service state's value in the stochastic valuation model). Since this study was applied to a branch of a medium size mutual company, the performance measure studied was "sales revenue."

The type of positional replacement costs used in this study were anticipated (budgeted) rather than standard costs. Standard positional cost data was not available. The types of data required by this study were: surrogate measures of a person's value and criterion measures to assess the surrogate's validity.

a. Measurements of the Surrogates

(1) Measurement of Performance. As already pointed out, annual sales revenue was used as a performance measure, and data was provided by the company.

(2) Measurement of Compensation. The compensation measure was annual salaries (simple annual compensation).

(3) Measurement of Replacement Costs. Positional replacement cost was used as a surrogate for a person's positional value, and realizable replacement cost was used as a surrogate for realizable value.

b. Measurement Criteria

The criterion used to test the validity of these surrogates was as already pointed out, a managerial ranking of people according to their perceived value to the organization. They were obtained by the alternation ranking method.

E. CONVERGENT AND DISCRIMINANT VALIDITY

The statistical method used to perform criterion-validation was convergent and discriminant validation

analysis. Convergent validation attempts to support the validity of the new measure by means of high correlations between it and the criterion. In addition to convergent validity, the proposed measure must also demonstrate discriminant validity, that is, it must not be too closely related to measures from which it is intended to differ.

In order to assess discriminant validity, each proposed measure is correlated with each trait or criterion that it is not specifically intended to measure. These correlations are termed discriminant validities. For a measure to pass the test of discriminant validity, it must evidence a higher degree of association to the criterion to which it is most closely related in theory than to other criteria. The measure of association or correlation between the proposed surrogates and the criterion variables was Kendall's Tau, a non-parametric coefficient of correlation. It was used because the criterion data were only available in terms of an ordinal level of measurement (ranks).

The results of this field test at statistical levels of significance <0.001 (1%) support the research hypothesis that replacement cost can be employed as a surrogate measure of individual value, as positional replacement cost for the positional value and realizable replacement cost for the realizable value.

Conditional replacement cost seems to be much less valid as a surrogate for a person's conditional value. It is not statistically significant.

In terms of discriminant validation analysis the results also confirm the validity of the proposed measures of replacement costs as surrogate measures of an individual's value to an organization.

As a conclusion we can state that two of these measures appear to be valid: positional and realizable replacement costs, and that we cannot unequivocably conclude that conditional replacement cost is valid or invalid.

In what it concerns the validation of performance and compensation measures as surrogates, we may conclude that sales revenues are a satisfactory surrogate for an individual's value in his current position, but this datum does not reflect all the elements of an individual's value to an organization. The same can be said for salary as surrogate of an individual's value.

Further research is needed in this field.

VIII. DESIGN AND IMPLEMENTATION OF HUMAN RESOURCE ACCOUNTING SYSTEMS

A. HUMAN RESOURCE ACCOUNTING SYSTEMS I-V

How is an organization going to design and implement its human resource accounting systems?

Different organizations require different degrees of human resource accounting capabilities. One organization may require only the most rudimentary system, while only the most advanced capability may be satisfactory to another. Similarly, the human resource accounting capability appropriate for a firm at one state may be quite inadequate at a later stage.

To illustrate the different types of human resource accounting capability, Figure 8.1 presents five human resource accounting systems. This table shows various functions of human resource management (human resource planning, decision making, conservation, etc.) and the human resource accounting capabilitieis provided by each system level.

An organization with a System I human resource accounting capability possesses most of the personnel systems which are prerequisite for the implementation of human resource accounting. System I consists of nominal but very elementary human resource accounting capability, i.e.,

HUMAN RESOURCE ACCOUNTING SYSTEMS I-V

CAPABILITY PROVIDED BY HUMAN RESOURCE ACCOUNTING SYSTEMS

Human Resource Management Functions	*System I*	*System II*	*System III*	*System IV*	*System V*
	Prerequisite Personnel System	*Basic HRA System*	*Intermediate HRA System*	*Advanced HRA System*	*Total HRA System*
I. Human Resource Planning	Manpower skills inventory Replacement tables	Estimated costs of recruiting, training, etc	Replacement costs	Standard and actual personnel costs Stochastic man power mobility models Manpower simulations	Stochastic rewards valuation model Human resource value simulations
II. Human Resource Decision making A. Budgetary	Personnel Costs included in "General and Administrative" expense	Personnel costs budgeted separately	Budgetary system for recruitment, training, replacement costs	Budget standard and actual costs Original and replacement costs	Human capital budgeting Budget ROI on human capital investment
B. Policy	Traditional selection, training, and placement methods	Value oriented selection decisions	Recruitment vs training trade off analyses	Manpower assignment optimization models	Value based compensation
III. Human Resources Conservation A. After the fact	Turnover rates	Turnover cost	Replacement cost	Opportunity cost	Human resource value depletion
B. Before the fact	N A	Attitudinal data	Expected turnover cost (replacement)	Expected opportunity costs Human resource accountability	Expected conditional and realizable value depletion
IV. Human Resource Evaluation	Performance and potential ratings	Perceived value rankings	Psychometric predictions of potential value Interval scaling of value	Measurements of economic value of groups	Measurement of economic value of individuals
V. Human Resource Management Efficiency Control	N A	Comparison of actual costs with historical costs	Comparison of budgeted and actual costs Variance analysis	Comparison of actual costs against standard Variance analysis	Interunit comparison of costs

Figure 8.1. Process Design and Implementation of H.R.A. System

it consists of personnel systems which are aimed at the same functions of more sophisticated human resource accounting systems, but which lack the advanced capabilities.

In a System II organization, the human resource planning function incorporates estimates of costs of recruitment and training. Personnel costs are budgeted separately and not merely lumped in "general and administrative" expenses.

Personnel policy decisions are based on a cost-value calculus. For example, personnel selection decisions are based on such criteria as a person's expected value to the organization. Decision-makers are more aware of the trade-offs between one person with a high expected conditional value and another with a high expected realizable value. In a System II organization, management not only has data on turnover rates, it also has data on the cost of turnover. Thus turnover is expressed in a more meaningful common denominator.

Attitudinal data, such as measures of satisfaction and perceived motivation, are available, and they are used as leading indicators to forecast probable changes in turnover. Under System II, human resource evaluation is based on criteria of perceived value which are obtained by alternative-ranking (totem-pole) methods. The efficiency of the human resource management process is assessed, and reports compare actual costs with historical costs of similar activities.

Under System III, there is intermediate human resource accounting capability. Human resource planning incorporates replacement costs as well as original costs. Budgetary and policy decision making for human resources are subjected to more systematic analysis. There is a formal system for budgeting recruitment, training, etc. Personnel needs are planned as a formal part of overall corporate planning, and not just on an ad-hoc basis. Policy decisions involving trade-offs between human resource variables are subjected to analysis. For example, the choice between recruitment of experienced workers versus hiring and training entry-level personnel is subjected to trade-offs analysis. In System III, the replacement cost of turnover is measured and reported.

Managers may be requested to explain controllable turnover. The human resource evaluation process is based on psychometric predictions of a person's potential, and value is assessed in non-monetary terms using interval scaling methods. The efficiency of the overall human resource management process is based on a comparison of budgeted and actual personnel costs and explanations of variances are required.

An organization with a System IV capability has an advanced human resource accounting system. In such organizations, human resource planning is based on standard

personnel costs. Stochastic models are used to forecast manpower mobility and predict future human resource needs. The computer is used to run human resource planning simulations, and parameters in the models are varied so that sensitivity analysis can be performed.

In the decision-making process, budgets are based on standard costs. Optimization models are used for personnel policy decisions. For example, manpower assignment may be based on optimization methods. Human resource conservation is assessed not only in terms of historical and replacement costs, but also in terms of the opportunity cost of human resources. The organization has an on-going system of human resource accountability, and one criterion used to evaluate managers is human resource conservation. The organization also has an on-going turnover control program, and it uses measures of expected opportunity cost of turnover as a basis for turnover control decisions. Under System IV, the organization accounts for the value of groups of people but not individuals. The efficiency of the human resource management process is evaluated by comparing actual costs against standard costs, and there is a formal system for reporting and explaining variances.

System V represents total human resource accounting capability. Human resource planning is based on a stochastic rewards valuation model, and simulations of the

effects of the overall corporate plans on human resource value are performed. In the decision-making process, there is a formal human capital budgeting. Return on investment is the criterion used to assess capital expenditures in human resources just as it is used for other resources. Personnel policy decisions are based fully on a cost-value calculus; for example, compensation is based upon a person's expected value to the organization.

Human resource conservation is controlled both before and after the fact. Anticipated human resource depletion is measured in terms of expected conditional and realizable replacement cost. Turnover control programs are initiated when expected depletion is too high. The System V organization has a human resource accountability subsystem, and managers are charged with the opportunity cost of controllable human value depletion.

Managers are expected to conserve human as well as physical and financial assets entrusted to them. The human resource evaluation process includes the measurement of the economic value of individuals per se as well as that of aggregates such as departments, plants, or divisions.

Finally, the efficiency of the human resource management function is assessed not only by comparison of actual against standard costs, but also by comparison among comparable organizational units. In sum, System V represents maximal human resource accounting capability.

These five systems of human resource accounting can be thought of as different levels of capability. At a particular time, System II may be more appropriate for a given organization than Systems III or IV. The system can also be viewed as stages in the development of an organization's human resource accounting capability. An organization may presently be in the first stage of human resource accounting capability and desire to ultimately reach the fifth stage. It may be reasonable, however, to gradually move from stage to stage and incrementally increase the organization's capability. Alternatively, the conditions may be appropriate for designing a System IV or V capability.

1. Factors Influencing the Choice of a System

After overviewing all the kinds of systems the organization can implement, the next question is "What factors should we consider to determine the degree of human resource accounting capability required?"

There are four major factors which must be considered: (1) type of organization, (2) size and structure of the organization, (3) existing human resource accounting capability, and (4) availability of data for developing human resource accounting.

a. Types of Organizations

The key variables which influence the types of organizations in which human resource accounting is

applicable are: (1) the degree of human capital intensiveness, (2) the number of highly educated or skilled personnel, and (3) the number of people occupying similar positions.

The more one organization is people intensive the more it needs human resource accounting.

Another key variable is the existence of a group of valuable human resources within an organization. These groups typically represent major organizational investments.

The third variable is the number of people who occupy similar positions because when this number is large it (1) allows a basis for statistical prediction, and (2) the comparability of positions provides a basis for comparability of performance and potential. The size and structure of the organization have both direct and indirect influences on the type of human resource accounting capability required. In very small organizations (<500 employees) there may well be no need for human resource accounting because management has personal contact and knowledge of operations.

b. Size and Structure of the Organization

The larger the organization, the more likely it is to be decentralized and the greater the degree of decentralization, the greater the need for human resource accounting. If there is no monitoring system of human

resources, it is very likely that important aspects of human resource development and conservation will be neglected.

c. Existing Human Resource Accounting Capability

A company's existing personnel systems and human resource capability also influence the choice of a human resource accounting system.

A company with inadequate personnel systems is unlikely to be able to digest more than System I capability. An organization with a computer-based manpower information system is in fine position to develop System V capability.

d. Availability of Data for Developing Human Resource Accounting

Another major factor influencing the choice of a human resource accounting system is the potential in the situation for actually developing given levels of capability. In some cases all of the necessary data is available or easily accessible. In other cases, some aspects of the required data may simply be unattainable. In these cases, the potential for developing human resource accounting is to intermediate (System III) or advanced (System IV) capability but probably no higher.

2. Phases in Design and Implementation of a System

The typology of the five general classes of human resource accounting systems is intended principally for illustrative purposes. It is unlikely that a specific organization's human resource accounting needs will exactly

match System I, II, etc. Instead a system will very likely have to be tailored to an organization's particular needs.

We will see a step by step approach to the phases involved in designing and implementing a human resource accounting system.

The phases drawn from Eric Flamholtz [Ref. 24: p. 277] are shown schematically in Figure 8.2. These phases are common to the development of any human resource accounting system whether it is System I or System V.

As shown in Figure 8.2, the five phases in the development of a system are:

(1) Identify human resource accounting objectives,

(2) Develop human resource accounting measures,

(3) Develop a data base for the system,

(4) Pilot test the system and revise it if necessary, and

(5) Implement the system in the organization.

We will describe these phases below.

a. Identify Human Resource Accounting Objectives

This is the first step in designing a human resource accounting system. While this may seem too obvious to be stated, it is unfortunately often a neglected step in the design of systems. The objectives of the system should be an outgrowth of management's requirements for human resource information, which must be defined explicitly.

To identify management's human resource accounting requirements, the human resource management

GENERALIZED MODEL OF PROCESS DESIGN AND IMPLEMENTATION OF A HUMAN RESOURCE ACCOUNTING SYSTEM

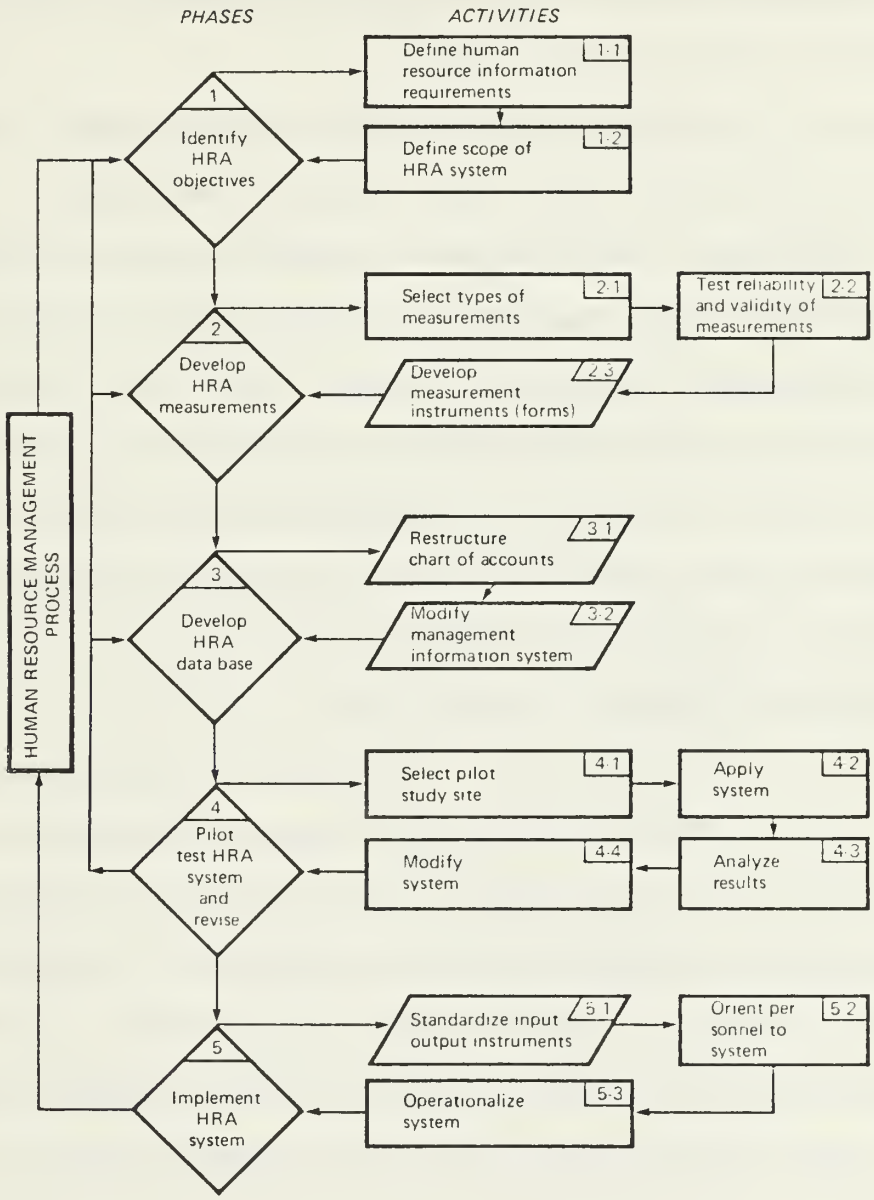


Figure 8.2. Process Design and Implementation of H.F.A. System

process must be studied and analyzed. In this analysis, each organizational unit responsible for human resource management should define its functions, indicate the kinds of decisions made, their relative frequency and information needed to make the decisions.

Information needs must be analyzed in relation to present information flows, and new information to be developed must be specified. Based on this analysis of requirements the scope of the desired human resource accounting system can be defined. The objective may be any, from an advanced human resource accounting system to a partial one. In sum, the objectives are determined by organizational needs, and must be stated explicitly. The objectives should not be merely "to develop a human resource accounting system."

b. Develop Human Resource Accounting Measurements

This is the second step in the design of a system. First, the types of human resource accounting measurements desired should be selected. The system may include either a single measurement or a set of measurements; it may include monetary or non-monetary measurements (or both); and it may include measurements of cost and/or value.

Once the measurements have been selected, their validity and reliability must be tested, which typically

involves special research studies. It would not be sound to base a system on untested measurements. Once the measurements have demonstrated satisfactory reliability and validity, they can be translated into forms to be used in the system.

c. Develop Human Resource Accounting Data Base

This is the third step. The data base is simply the source of the inputs required for human resource accounting, including cost data, time sheets, psychological measurements, etc. Normally in developing the data there is the need for restructuring the organization chart of accounts; the accounting system of many organizations simply do not classify personnel related costs separately. The accounts should be organized in relation to responsibility centers, as for example "recruitment", "training", and "employee relations" centers.

In addition to restructuring the chart of accounts, other aspects of the organization's information system may have to be modified. The information must be adapted to collect various types of non-financial data required for human resource accounting, as for example, attitude surveys, probabilistic estimates of employee mobility, which are necessary for measuring human resource value. These data must become part of the formal management information system.

d. Pilot Test the System and Revise

This is the fourth step. Once objectives have been defined, measurements developed, and a data base constructed, the next step is to pilot test the system. The purpose is to "experiment" with the system and "debug" it prior to institutionalizing it.

The site for this pilot study ought to be selected very carefully. It should promise a high likelihood that it will be feasible to operationalize the system. The site should be "controllable", that is, there should be a minimum number of extraneous problems to present "noise" in the pilot study and possibly contaminate its results. It is virtually necessary to obtain the cooperation of management at the pilot site, which means that management must understand and perhaps even participate in the system's design.

Once the system has been applied, the designer can obtain feed-back in its performance. Weaknesses can be identified, especially the emergence of unintended dysfunctional (counter-productive) behaviors. The system should then be analyzed for its utility, efficiency, cost, etc., and modified if necessary.

e. Implement the Human Resource Accounting System

This is the final step, and it involves the actual implementation of the system. The input and output

documents must be standardized, and instructions for administration of the system must be issued. A key step involves the orientation of personnel to the new system. Its purposes, uses and methods should be explained.

IX. APPLICATION OF THE NORMATIVE ECONOMIC VALUATION MODEL

A. DESCRIPTION OF THE MODEL

This section draws upon [Ref. 25: pp. 259-264].

1. The Model

Economic valuation is the process of measuring a resource's value in monetary terms. The valuation process does not determine value; it merely attempts to represent a resource's value in terms of a monetary equivalent stated in today's dollars, francs or escudos.

The valuation of a particular resource is achieved by means of a valuation model, a set of operations which measure the monetary worth of a resource's expected value. The valuation process is diagrammed in Figure 9.1.

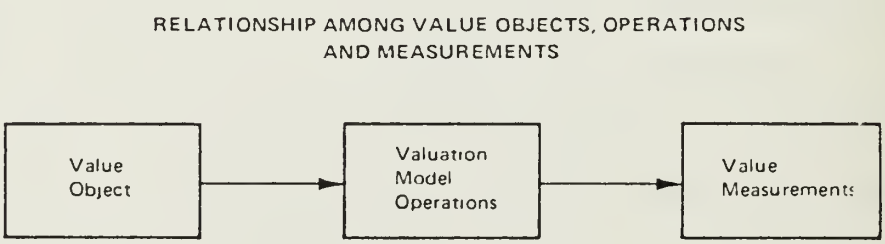


Figure 9.1. Valuation process

2. Elements of the Valuation Model

Given a value object (say, a building), the valuation process requires a set of operations which generate a valuation of its expected future services. The valuation is, therefore, a monetary representation of the resource's expected future services.

Accordingly, there are three basic kinds of operations which must be determined by any valuation model: (1) the valuation time period, (2) the resource's expected future services and/or their monetary equivalent, and (3) the present or discounted worth of the monetary equivalent of the resource's expected future services.

a. Valuation Period

Valuation period is the future period during which the resource is expected to render services--the resource's expected service life. For example, the anticipated service life of a machine may be seven years. Service life is influenced by many factors, including an asset's physical deterioration rate and the risk of its obsolescence. Since these factors cannot be predicted with certainty, it is necessary to measure a resource's expected service life probabilistically. So, we refer to "expected service life."

b. Monetary Representation of Expected Services

By definition, a resource's value is determined by the services it is expected to render in the future. To

facilitate a variety of economic decisions, it is necessary to measure a resource's expected services in terms of a monetary equivalent. Thus, to value human resources on a base consistent with that of other resources, their expected future services must be measured in monetary terms.

For all resources, this monetary representation can be derived in two ways: (1) by determining the product of their expected quantity and price, and (2) by calculating the income expected to be derived from their use. These two methods are known as the price-quantity and the income methods.

(1) Price-Quantity Method. The price-quantity method of representing services in monetary terms requires identification of a service criterion, or measure of a resource's service. For example, expected machine hours is a possible service criterion for machinery. The service criterion functions as a measure of a resource's expected services at different future times. The price, or market value of the services must also be determined.

(2) Income Method. The second possible approach is the income method. A resource's future services may already be stated in monetary terms because they are forecast as expected future income. For example, the expected future income of a building is already stated in monetary terms, as expected rentals. When resources are

used in combination to generate income, it is possible, at least in principle, to forecast the income expected to be derived and to allocate a portion to each particular resource according to some measure of its relative contribution. This assumes, of course, that the organization is presently optimally investing in each class of resources.

(3) Present Monetary Equivalent of Expected Service. By definition the valuation model attempts to determine the present worth (or value today) of a resource's expected future services. The rationale is that money on hand today is obviously worth more than the expectation of receiving money in the future, not only because of the uncertainties associated with future events, but also because it can be invested and earn interest. It is necessary, therefore, to discount the monetary equivalent of expected future services to their present worth or value today. This requires the use of a discount factor, in the case the reciprocal of the interest rate.

3. The Model as a Whole

The valuation model described above, was presented by Eric Flamholtz [Ref. 26: p. 369] and is shown graphically in Figure 9.2.

The figure shows the monetary equivalent of expected future services on the vertical axis and time on the horizontal axis. At time 10, the vertical bar represents

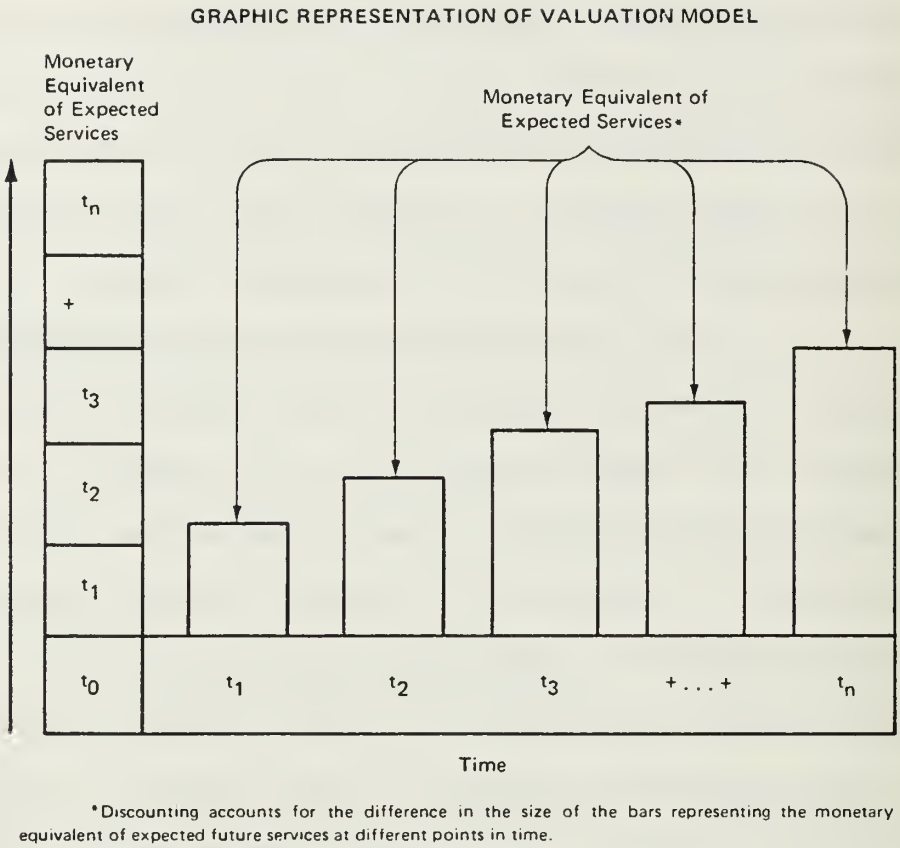


Figure 9.2. Graphic Representation of Valuation Model

the accumulation of the discounted future receipts of monetary equivalents of expected services. The bar is partitioned into sections which represents the present worth of monetary equivalents at times tl, t2, t3, ..., tn where n is equal to the valuation period. The vertical bars shown at time tl, t2, ..., tn represent the monetary equivalents of services expected to be derived at those points, before discounting.

4. Problems When Applying the Model

Several problems will be encountered in any attempt to apply the above normative model. The first difficulty may arise when we try to forecast a resource's expected service life. Next, there may also be problems in forecasting the quantity of services expected to be rendered by a resource. Similarly, it may be difficult to determine "prices" for these services. If income is generated by a resource in combination with other resources, it may be difficult to find a valid procedure for allocating income among the individual resources. Finally, in order to calculate the present monetary equivalent of expected services, it is necessary to select a rate of interest to discount future cash flows.

a. Need for Surrogate Measures of Economic Value

The problems identified above are frequently encountered in applying the normative economic valuation model in the real world.

The problem as Canning explains [Ref. 27: p. 192] is that "The economist, in general, calmly assumes the existence of data that never have been available and never will be."

Thus, we are faced with a paradox: in principle the normative economic valuation model is the appropriate method for resource valuation, while in practice

it is frequently difficult, if not impossible, to apply. For this reason, because of anticipated difficulties involved in applying the normative economic valuation model, it is necessary to use surrogate or proxy measures of economic value.

b. Possible Surrogate Measures of Economic Value

As already stated accounting has traditionally employed measures of historical or original costs to avoid the difficulties in economic value measurements. Accountants have recognized the limitations of original costs valuation, and have not mindlessly assumed an identity between cost and value.

The basic rationale for historical cost valuation has been that the price actually paid for an asset by a purchaser reflects his assessment that its value to him at the time of acquisition is at least as great as its price. The existence of a transaction is thought to lend support to the acquisition cost valuation.

Recently, there have been some efforts to justify the use of replacement cost valuation and/or current market price either in place of historical cost or in addition to it. Current cost refers to the current price that exists for a resource in the market in which it is bought and sold. Replacement cost refers to the sacrifice that has to be incurred today, by an organization in order

to replace an existing resource with another capable of providing an equivalent set of services. Both of these constructs refer to the cost of an asset as a whole, not a subset of its services.

For valuation purposes, the choice between replacement or current costs versus historical cost depends upon the intended purpose of the surrogate measure.

Historical costs have traditionally been employed in financial statements because of an emphasis upon verifiability or objectivity. However, the same degree of verifiability may not be required for the information used internally as that required for information used in external reports.

For internal purposes, such as managerial decisions, replacement or current costs may be more useful than historical costs because they are more valid representations or value, even though they may be somewhat less verifiable.

The choice between current costs (or replacement costs) versus historical costs (acquisition cost, outlay cost, original cost, book value), thus depends, in a particular instance, upon the objective of using a surrogate measure. As the American Association Committee to Prepare a Statement of Basic Accounting Theory suggests, "...each measure is useful under different conditions: Historical

transaction-based information has veen verified by a market transaction, and hence is of great usefulness when verifiability is emphasized. Current values, on the other hand, reflect not only the transactions of the firm but also the impact of the environment on the firm beyond the complete transactions. Thus they possess a high degreee of relevance for many uses in which prediction is proeminent" [Ref. 28: p. 33].

c. Application to Human Resource

In principle the normative economic valuation model can be applied to the problem of human resource valuation. It can be used to value individuals, groups and the total organizations.

We will see a tentative application of this model to a sector of the Portuguese Navy human resources.

B. EXAMPLE OF APPLICATION

Given the existing elements of the Portuguese Navy, we will try to apply this model to one of its individuals.

Let's assume that a LCDR of the Line Community wishes to retire when he has a LOS of 15 years (LOS doesn't include Naval Academy).

What is his value to the Navy?

1. Elements of the Expected Realizable Value

We are interested in finding the officer's expected realizable value. As we recall, expected realizable value

is the present worth of the services actually expected to be derived during the individual's anticipated tenure in the organization.

Conceptually it is the product of his conditional value (the present worth of the potential services that could be rendered to the Navy, if the individual maintained organizational membership throughout his expected life), and the probability that the individual actually maintains membership.

For applying this model we need to know three basic elements: (1) the valuation time period, (2) the individual's expected future services and/or their monetary equivalents, and (3) the present or discounted worth of the monetary equivalent of the individual's expected future services.

a. Valuation Time Period

We need to know the pattern or standard career of the line officer.

Using statistical techniques and the elements of the Portuguese Navy, we could find the following pattern (time of staying in the several ranks, in years):

O1(ENS) -.73	O4(LCDR)-6.10	O7(RADM)-2.5
O2(LTJG)-4.29	O5(CDR) -5.13	O8(VADM)-1
O3(LT) -8.71	O6(CAPT)-2.92	O9(ADM) -5

The valuation for 07, 08, and 09 cannot be considered normal because the number of billets in the Portuguese Navy is smaller than 30. Also the staying rate for 09 (ADM) was estimated, since we only have one billet, for CNO.

The spectrum of the career is the following:

ENS	LTJG	LT
0----------.73	----------5.02	----------13.73---
.73	4.29	8.71

LCDR	CDR	CAPT
13.73----------19.83	----------24.96	----------27.88---
6.10	5.13	2.92

RADM	VADM	ADM
27.88----------30.38	----------31.38	----------36.38
2.5	1	5

years (LOS)

To compute the total time a cadet would have to serve to make the various ranks, we should add five years of Naval Academy.

The sample used belongs to individuals joining the Naval Academy in 1953-54.

In fact, for more reliable values we should have studied the evolution of staying and promotion rates for each rank, but there is no data available for it.

b. Individual's Expected Future Services

The value of the officer's future services is very difficult to assess directly. We need to use a surrogate measure, in this case his salary.

The rationale for doing so is based on the notion that the salary is at least a lower bound for the services the officer is rendering (if the Navy's assessment of an officer's services was lower than what he is paid, he should be paid less).

c. Discount Worth of the Expected Future Services

Since we have chosen salary for proxy measurement of the officer's future services value, we should know its amount and discount it.

It is difficult to assess today what is going to be the salary of any officer in 2, 5 or 10 years. But one thing we know, i.e., the salaries then will likely reproduce the pattern they have today. So, we can rely on this notion and assume for the discounted salaries on each grade the values they have today.

We cannot be sure of the values of the discounted salaries because we have not the actual values from the Portuguese Navy, but for the sake of this example

we will use the following approximate values (annually and in thousands of escudos):

01-$630	04-$840	07-$1050
02-$700	05-$910	08-$1120
03-$770	06-$980	09-$1190

d. Probabilities of Maintaining Membership

For assessing the expected realizable value we need to know the probabilities that any officer will ultimately make the different ranks.

From the data available we could find the following:

P(01 promoted to 02) = 1

P(02 promoted to 03) = 1

P(03 promoted to 04) = 1

P(04 promoted to 05) = .75

P(05 promoted to 06) = .66

P(06 promoted to 07) = .21

P(07 promoted to 08) = .32

P(08 promoted to 09) = .17

Practically speaking there are no demotions in the Portuguese Navy, so they were not considered.

2. Computation of the Expected Realizable Value

The value of the officer to the Navy or his expected realizable value is computed by:

$$E(R.V) = (Xi.Si.Pi)$$

where E(R.V.) = expected realizable value, n = maximum rank attainable by the officer, i = actual rank of the officer, Xi = remaining number of years in rank i, Si = annual salary of rank i, and Pi = probability of officer make rank n, starting in rank i.

Recall that in fact Pi = P(i,i+1)

Before going into the computations we must calculate the expected remaining LOS in LCDR of the 15 years LOS individual leaving (since it is the value of our example).

The remaining expected LOS in LCDR = (.73 + 4.29 + 8.71 + 6.10) - 15 = 4.83 years (summation of mean times in 01 + 02 + 03 + 04 minus the actual LOS).

Now we have all the elements for computing E(R.V.):

E(R.V.) = (summation of the value to the organization of the LCDR during the years he is expected to stay in each rank provided he makes those ranks),

or

= (summation of the annual salary in each rank times the expected time in each rank times the probability of making the rank), in numbers.

= (value in LCDR) x P(LCDR) + (value in CDR) x P(CDR) + (value in CAPT) x P(CAPT) + (value in RADM) x P(RADM) + (value in VADM) x P(VADM) + (value in ADM) x P(ADM).

$$E(R.V.) = (4.83 \times 840) \times 1 + (5.13 \times 910) \times .75 + (2.92 \times 980) \times .75 \times .66 + (2.5 \times 1050) \times .75 \times .66 \times .21 + (1 \times 1120) \times .75 \times .66 \times .21 \times .32 + (5 \times 1190) \times .75 \times .66 \times .21 \times .32 \times .17 =$$

$$= 4057.20 + 3501.23 + 1416.49 + 272.87 + 37.26 + 33.65 =$$

$$= \$9318.70$$

Thus, 9,318.70 thousands of escudos (US $56,250) is the amount the Navy should value the 15 years LOS LCDR that is willing to retire.

Should we have more complete and accurate data, the Markov manpower model or Pattern Analysis models could have been used for assessing the rates and mean times.

X. A LOOK TO THE FUTURE

The prior chapters described the current state of human resource accounting; this chapter examines the unresolved problems discussing the future research required, and presents the scenario of the future impact of human resource accounting.

A. UNRESOLVED PROBLEMS

There are five basic classes of issues which have not yet been resolved fully in human resource accounting: (1) the question of its utility to management and/or investors, (2) the development of measurement methods, (3) the development of operational methods in organizations, (4) the organizational impact of human resource accounting, and (5) the appropriateness and methods of reporting human assets to external users of corporate financial accounting information.

The specific problems in each of these generic classes are examined below. Also, some possible directions for future research are suggested.

1. Utility of Human Resource Accounting

Is human resource accounting a useful pursuit?

This is a fundamental question. The broad issue of human resource accounting utility comprises two specific sub-problems: (1) Does human resource accounting actually

"make a difference?", and (2) If it does make a difference, is the difference beneficial or dysfunctional (harmful)?

a. Differential Effects of Human Resource Accounting

When we ask the question "does human resource accounting make a difference?", we are actually asking a set of related questions, like: does it make a difference in personnel planning or decision making? Would the actions taken by management be the same even if they did not have human resource accounting information? Are managers intuitively able to take human resource factors into account without the availability of measurements of human resource cost and value?

At present we should admit that questions of this type have not yet been answered. Ultimately, they are empirical questions, and they must be answered by studies of the effects of human resource accounting on management and investors decisions behavior.

A comprehensive future research plan would involve a series of laboratory and field experiments, field studies and case histories.

The laboratory experiments would be useful for a controlled study of the effects of changing various human resource accounting variables on the decisions of managers or other users of accounting information. Elias, in a pioneering study of this kind [Ref. 29], conducted a

laboratory experiment of the effects of including investment in human assets in financial statements for external users. His conclusions were that management was sensible to human assets reporting.

Another aspect of this research would be field experiments to study the effect of output from actual human resource accounting systems on management and investors decisions. These field experiments increase the realism of the research but do so at the cost of decreased scientific control for it is clearly quite impossible to control all the variables in a functioning organization.

For doing these field studies, we also need some existing system of human resource accounting. There is a certain degree of circularity here: we need field experiments to justify human resource accounting, yet field experiments require existing human resource accounting systems...

A third aspect of required future research ought to be field studies and case histories. We must study the impact of various human resource measurements in different types of decisions. For example, we should study the use of measurements of human resource cost and value in selection, development, allocation, replacement, lay-off, and compensation decisions.

b. Functional or Dysfunctional Effects of Human Resource Accounting

This is the other major question involving human resource accounting utility. If it makes a difference, is that difference beneficial or harmful?

These questions must be answered from the perspective of both the organization as a whole and the individuals or groups which are the subjects of human resource accounting. At present we simply do not have empirical data to help answer these questions. Here, too, we need a program of research designed to deal with these issues.

The ultimate test of human resource accounting's functional or dysfunctional effects must be derived from field experiments and field studies, and future research is needed.

2. Measurement of Human Resource Cost and Value

Although there has been some works in this area, future research is needed, to assess the reliability and validity of models and methods for measuring human resource cost and value. Such research involves the need for both original validation studies and replications in similar and different industries to assess whether results are generalizable.

a. Human Resource Cost Measurement

At present there are no published accounts of the reliability of data derived from any existing system for

reliability of data has important implications for the development of human resource accounting. Management cannot be expected to have confidence in systems whose reliability is unknown.

In the future, researchers and system designers should test the reliability and validity of methods of accounting for human resource cost, as an essential pre-requitie prior to the application of these models in actual organizations.

b. Human Resource Value Measurement

The basic research need in the area of human resource valuation is for empirical testing of proposed methods. In other words, it is necessary to test the reliability and validity of proposed methods for measuring human resource value.

There must also be further empirical testing of the validity of the stochastic rewards valuation model proposed by Eric Flamholtz.

3. Development of Operational Systems

Although some organizations have already begun to develop and implement operational systems of human resource accounting, a great deal of future research is still required in this area.

We need to learn more about the factors which make human resource accounting Systems I-V appropriate in particular organizations.

Another unresolved problem involves a lack of a basic empirical data on human resource cost and value. Due to the newness of this field, we still lack information about many basic issues, like: recruitment, selection, training, outlay or opportunity costs. What is the relation between investment in human resource (recruitment, selection, training) and organization's productivity? What is the relation between a person's human resource investment balance and his salary? What is the ratio of investment in human assets to other assets for various organizations?

Answers to these and related questions will help us understand the needs of different types of organizations for human resource accounting, and its relative importance in one organization with respect to another.

When such basic empirical data is available, we may be able to answer important questions about the development and implementation of human resource accounting: What are the characteristics (e.g., size, industry, profitability, management style) of organizations which are most interested in human resource accounting? Why has it developed in some types of organizations but not in others?

4. Organizational Impact of Human Resource Accounting

This is another major area for future research--the study of the effects of human resource accounting on the attitudes and beliefs, and behavior of people as individuals and organizations as a whole.

Will human resource accounting effect management's attitude, beliefs and behavior? According to Robert L. Woodstuff, Jr., Vice President-Human Resources and Management Systems at R.G. Barry Corporation, "...the very act of attempting to account for the organization's human resources focuses the attention of all managers on the importance of human resources" [Ref. 30: p. 20].

Human resource accounting is also anticipated to influence the attitudes of people whose cost and value to a firm is measured. What are the attitudes of people towards human resource accounting? What are their attitudes towards the idea of an organization accounting for themselves as "human assets"?

Future research is thus necessary to study the following types of questions about the effects of human resource accounting on people's attitudes and beliefs: Does the availability of measurements of human resource cost and value increase management's awareness of the importance of human resources? Are managers' perceptions of an individual's productivity and/or promotability influenced by knowledge of the person's human resource value? How does a person react to the knowledge of his (her) human resource value in relation to that of peers?

Future research is also needed to study the behavioral impact of human resource accounting. Some of the

relevant questions are already discussed in this chapter. Other important questions are: If people know that their cost and value as human resources is being measured, will they be motivated to increase it? What are the dangers of misuse of human resource accounting measurements? Under what ypes of managerial styles is human resource accounting most appropriate? Will there be resistance to the introduction of human resource accounting by managers, blue-collar workers, white-collar workers, unions, etc.?

5. Corporate Financial Reporting of Human Assets

This subject is not in the scope of this thesis, but I will refer to it briefly. It deals with the problem of "putting people in the balance sheet." Future research is required to develop valid and reliable methods for measuring and reporting investment in human assets in financial statements. Techniques must also be developed to cope with the potential problems of earnings manipulation from capitalizing and amortizing human assets. Research is also necessary to study the effect of investment in human capital or corporate rates of return.

B. HUMAN RESOURCE ACCOUNTING POTENTIAL IMPACT

Till now we examined in this chapter the unresolved problems of human resource accounting. Now, we turn to the future, and we will try to explore the potential future impact of human resource accounting on personnel management,

management accounting, corporate financial reporting, social accounting, and human resource management theory.

1. Impact on Personnel Management

Human resource accounting ultimately will influence the process of personnel management. It will permit personnel decisions to be based on cost-value calculus, i.e., on an assessment of the costs and values involved in a decision. It will permit personnel planning to be based on systematic, quantitative methods. It will provide management with the information needed to effectively and efficiently acquire, develop, allocate, utilize, evaluate, and compensate human resources.

At present, the personnel function in organizations (both large and small) typically has limited influence. Personnel activities tend to be viewed as improductive, costly programs which should be minimized to the extent possible. In part this attitude towards personnel arises because it is difficult to measure the output or value of expenditures made on personnel activities.

Because personnel are somewhat viewed as unproductive when an organization faces a profit squeeze, the personnel department's budget is often the first to be cut; the training budget may be substantially reduced, or the manpower planning staff may be cut to trim the organization's "unproductive overhead." These actions may be quite

harmful to the organization and may affect the long-term profitability; however, their costs remain hidden.

One result of human resource accounting may be to document personnel's contribution to the economic goals of the organizations. It may be possible to show how the personnel function has enhanced the value of the human assets, and, in turn the value of the organization as a whole.

In addition, human resource accounting will make it possible to measure the hidden costs of reducing personnel activities such as training. Once it is possible to measure personnel's contribution and relate it to the organization's common denominator, profitability, attitudes toward the personnel function may become more favorable. This, in turn, may lead to greater influence by personnel managers in corporate planning.

2. Impact on Management Accounting

The role of managerial accounting is to supply information for planning and control. Human resource accounting will enlarge the boundaries of managerial accounting.

The management accountant must provide some data for human resource accounting from conventional accounting systems (e.g., the original cost of recruitment, selection, placement, and training). To do this, the conventional

chart of accounts in most organizations must be revised to clarify personnel costs separately from general and administrative expenses.

The managment accountant must also present data presently outside the scope of conventional accounting systems such as measurements of replacement cost, opportunity cost, principal and surrogate measures of economic value, and subjective and historical probabilities.

3. Impact on Corporate Financial Reporting

Human resource accounting will also have an impact upon corporate financial reporting. In the future, corporations will report on their investments in human assets. This information will permit investors to assess a firm's return on all its assets, human as well as financial and physical. As the world economy becomes comprised more and more of service industries, it is increasingly necessary to measure investment in human as well as other forms of capital.

4. Impact on Social Accounting

Human resource accounting will also have an impact on social accounting. In the future, we can expect organizations to be concerned with demonstrating their social responsibility towards employees.

As measurement methods are developed in human resource accounting for other uses, they will be applied to

assess the appreciation or depletion of socially valuable human capital by organizations. For example, the aerospace industry sometimes lays-off engineers who have become technologically obsolete while at the same time it hires recent engineering graduates of universities. Society invests significant amounts of money to develop such human assets, and may require the aerospace industry to be held accountable for its use of such assets.

5. Impact on Human Resource Management

Ultimately, perhaps the greatest impact of human resource accounting will be in the management of people per se. Flamholtz believes that "...the notion of human resource value will lead to a value-based paradigm for the management of people.

Because of the attention-directing effect of measurements, management will become more conscious of the need and opportunity to appreciate the value of human resources, and in turn, the value of an organization as a whole" [Ref. 31: p. 337].

C. CONCLUSION

Beyond its literal definition, the notion of human resource accounting is a metaphor. It denotes a view that people are valuable organizational resources and suggests that we must account for people just as we do for other valuable resources.

Thus, human resource accounting is not only a measurement system; it is a way of thinking about people and their management in organizations.

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